

December 3, 2019

To the Graduate Program:

This project, entitled “Brain-based learning strategies to work with ELLs” and written by Cesar Salazar Cortes, is presented to the Graduate Program of Greensboro College. I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts with a Major in Teaching English to Speakers of Other Languages.

Paula Wilder, Advisor

We have reviewed this
Project and recommend its
Acceptance

Michelle Plaisance,
Director, Graduate Program in TESOL

Kathleen Keating
Chair, Department of English

Accepted for the Graduate Program

Jane C. Girardi

BRAIN-BASED LEARNING STRATEGIES TO WORK WITH ELLs

Presented to
The Graduate Program
of
Greensboro College

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in
Teaching English to Speakers of Other Languages

by
Cesar Salazar Cortes

December 2019

Advisor: Paula M. Wilder

Abstract

Teaching English as a second language (ESL) has been a challenging task due to the diverse experience that teachers and English language learners (ELLs) encounter in the learning process. Some of the experiences involve ELLs' learning difficulties, gaps in previous education, socio-cultural adaptation issues, emotional or affective barriers. ESL teachers and content instructors use teaching strategies based on linguistic and content approaches that may not cover the ELLs' academic needs. Brain-based learning approach (BBL) is a significant way to engage ELLs to maximize their skills since the knowledge of the brain. BBL aims teachers and ELLs to understand the brain's areas, functioning and the importance of its stimulation to effective learning. The current paper proposes BBL as an alternative strategy to teach ESL in the classroom. The final product presents a handbook based on BBL strategies to work with ELL. Teachers and ELLs find meaningful information about the brain areas, the functions, the effects on the brain when learning a second language (L2). Moreover, a section describes an ELL's profile and some of the needs when facing a new learning environment. In the last part, the BBL handbook suggests some strategies and activities to work with the ELLs.

Dedication

I would like to thank God, my family and friends the support and encouragement given. Without this love and support, I would have been unable to accomplish this thesis or any other work along the Master's courses, so I dedicate this thesis to them.

Acknowledgements

I would like to express gratitude to everyone who contributed to my academic achievements, to Dr. Michelle Plaisance and professor Paula Wilder, my advisor, for showing interest on guiding my thesis writing process. I would also like to thank my professors, Dr. Helena King and Dr. Kathy Lyday for supporting my learning process in the classes.

Table of Contents

Title Page	i
Abstract.	ii
Dedication	iii
Acknowledgements	iv
Table of Contents	v
Chapters	
1. Chapter One: Introduction	1
2. Chapter Two: Literature Review	5
3. Chapter Three: Project design.	22
4. Chapter Four: Product	26
5. Chapter Five: Conclusion	49
Appendix	52
References	56

Chapter One: Introduction

Teaching English as a second language (ESL) is an exciting experience that may lead teachers to explore new paths to promote English language learning in the classroom. Teaching K-12 ESL learners in Prince Edward County Public Schools in Virginia has provided me with opportunities to learn meaningful instructional strategies. I have noticed regardless of the teaching strategies used in the classroom, some gaps still make the ESL learning process more challenging. By recognizing how the brain uses its capacity to process and perceive information, instructional practices based on brain-based learning (BBL) can be implemented to provide students with tools to process and perceive information in a more meaningful and effective way. “Brain-based teaching, referred to as brain-compatible or brain-friendly, is evolving to use knowledge about the brain in order to design and implement developmentally appropriate practices in the classroom” (El-Henawy, 2018, p. 117). As a consequence, BBL will guide ESL and content teachers to assist ESL learners in improving their language skills as well as reducing socio-cultural obstacles.

Taking into account the obstacles some ESL learners and teachers encounter, I plan to elaborate on BBL in an online PDF handbook document with information. The BBL handbook will include information about the brain, the importance of using it in the classroom, teaching and learning strategies that could work in the classroom, as well as some recommendations for dealing with cultural and social situations that could create

trauma. Salem (2017) stated that the BBL approach helps students learn and use the language in a meaningful way by exploring the brain’s work; thus, the language learner acquires skills to use brain’s work techniques spontaneously to take advantage of learning opportunities

and to make learning last longer. Brain-based learning is a new perspective in promoting English language learning, and a handbook will promote meaningful ideas to enhance routines in the classroom.

The purpose of the BBL handbook is to provide ESL teachers with instructional and learning strategies, formative assessments, activities, and resources to assist learners to build their language and socio-cultural knowledge in the classroom. Moreover, the handbook helps teachers recognize relevant information about the processing of information when reading and writing and cognitive issues in the brain that can impact behavior and academic functioning; thus, ESL teachers may be able to identify and resolve demanding learning situations with English language learners (ELL) in the classroom. My experience in neuropsychology and language learning has aroused my interest in creating the BBL handbook for ESL teachers. The English language process should be supported in the BBL since the four language skills processes take place in the brain: reading, listening, writing, and speaking. Likewise, sociocultural features involved in the language process occur in the emotional part of the brain. Through the BBL handbook, ESL teachers will be made aware of the brain functioning as well as the language learning instruction in the classroom.

Brain-based learning in English language instruction is important because teachers need to know how the brain works and processes information. "Brain-based learning is all about: knowing how our brain works, then using that to foster better student outcomes" (Jensen's 1998 cited in Valipour, & Araghi, 2014, p. 230). Besides learning general concepts of the brain, ESL and content teachers learn aspects about attention, motivation, emotions, trauma, and other aspects relevant to the learning and socio-cultural experiences. The knowledge gained from the handbook supports teachers as they develop and adjust their curricula to support ESL learners

as they achieve language and academic goals based on BBL. As a result, BBL could help ESL and content teachers to engage learners in the knowledge of the brain and to be aware of it when learning a second language.

In addition, educators have the opportunity to recognize students' learning styles and the most suitable way to approach instruction by making use of some of the BBL strategies. Furthermore, teachers understand why certain behaviors take place when an ESL learner perceives a socio-cultural threat in that such "exposure to stress or violence also causes the brain to reorganize itself, increasing receptor sites for alertness chemicals. This increases reactivity and blood pressure, and the child will be more impulsive and aggressive at school" (Jensen, 1998, p. 19). The BBL approach reminds educators to consider emotions and feelings as an important aspect in the English language acquisition process because the attention, memory, and affective filters can be positively affected by the use of BBL. For this reason, BBL should be considered as an alternative resource to support ELLs as they discern their learning styles in achieving language and content learning goals.

Holding a Master's Degree in Neuropsychology and Education provides some experience in BBL. In my Master's courses, I learned and explored concepts related to the brain and its functions as well as some strategies to intervene when a language learning difficulty arises. In addition, for the last three years I have been working as a K-12 ESL teacher in a low-income area, and I have noticed the challenges that the ESL students face in the academic, social, and cultural environments due to the lack of a suitable support. For instance, the social trauma when a ELL comes into to a classroom where no one uses the L1 to support personal needs, when a limited English proficiency (LEP) student receives a worksheet and directions are with

incomprehensible language and some other situations that hinder ESL learners' ability to obtain a suitable education and assistance.

Taking into account my previous academic and professional experiences, I consider the project benefits, not only my academic and professional growth, but also assists ELLs, teachers, and administrators. English as a second language students have the possibility to learn how the language learning process works in the brain as well as the strategies and activities to use inside and outside the classroom to cope with language and socio-cultural challenges. Moreover, my research provides ESL content teachers and administrators with background knowledge about how the brain learns a language. The project also provides educators with a different view about why some behaviors could occur when an ESL learner is experiencing socio-cultural challenges. This brief view supports the academic environment to set a concrete mindset about the ESL learners' situation when enrolling and staying in the school system. To make English language learning and teaching an exciting experience, content teachers, ESL teachers, and ELs should be aware of the power of the brain in the language process. One possible perspective is the BBL approach in the classroom; this handbook is designed to guide educators and learners in the English language learning process.

Chapter Two: Literature Review

The trend in English as a second language (ESL) learning combines a series of instructional strategies coming from teaching frameworks that involve ESL teachers and students to follow a series of steps to achieve a goal. However, some teaching frameworks might take for granted the capacity of ELLs' brain to power the second language (L2) learning process. The current chapter reviews scholarship related to Brain Based Learning (BBL) and the virtues of considering the use in the ESL classroom. Understanding BBL as an alternative tool in the ESL classroom is pivotal as BBL relates to some concepts about the brain, its function, language learning process, theories, and the changes in the brain when learning an L2. In the second place, some of the ESL learning process features are described such as socio-cultural process, trauma, and psycholinguistic patterns and how the ELLs' brain works. Finally, a definition and virtues for BBL are presented as well as a series of strategies for teachers to implement in the ESL classroom.

The Brain and the Language

Language processing takes place due to a series of functions and connections in the brain. The following discussion accounts for some scholarship that suggest the need to explore the brain in order to comprehend its functions and structures related to language processing. The studies pointed out the language and the brain work to promote meaningful learning experiences. Ping Li's report (2017) argued that some linguistic aspects that take place because of the activation of different parts of the brain, such as lexicon (recalling words, memory), phonology (hearing system), spelling (visual system), grammar (syntax) and pragmatics (oral production).

Moreover, Fingelkurts et al. (2010) noted that biological bases of the language needed to be considered in order to make ground on the nature of the language capacity, thus, to come to a full knowledge of the differences of the human brains from other living beings. Furthermore, Bournot-Trites et al. (1995) noted that language is a cognitive function joined in three groups; one group is the perception, the memory and the thinking, another one is the verbal- nonverbal group, and the third group is based on the parts of the brain that guide cognitive processes. Luria's neuropsychological theory (Luria, 1973) is supported in the third group. Luria (1973) stated that

Human mental processes are complex functional systems that are not in localized in narrow, circumscribed areas of the brain, but take place through the participation of groups working brain structures, each of which makes its own particular contribution to the organization of this functional system. (p. 43)

According to Luria (1973) the organization of the function system is processed in three phases, Planning, Attention or Arousal, and Simultaneous-Successive (PASS). This perspective, known as the PASS model, made Luria's theory (Luria, 1973), a pivotal feature in the relationship between language and cognitive process in the brain.

In addition, Mikadze (2014) also highlighted the importance of Luria's neuropsychological theory concerning the external factors that activate some brain functions. Mikadze (2014) believed mental functions changed by interacting with external environments, such as cultural, historical, language-specific features of the social environment, and the of education practices at home and at school. Consequently, the influence of Luria's (1973) theory is significant because it brings up three relevant aspects: the brain, the language, and the school environment. Luria's model and other perspectives are taken into consideration in order to know

what specific parts of the brain are involved and activated to process the linguistic features in the brain to acquire language. The previous studies have emphasized the relationship of the brain and language. Ping Li (2017) suggested the linguistic features involve in brain. Meanwhile, Bournot-Trites et al. (1995) noted the contributions of Luria's (1973) theory to the mental functions and language features in the brain as well as the importance of the biological foundation of the language. To establish a closer relationship among brain, language, and environment, exploration into the language processing and the brain's structures and their functions is necessary. This closer view helps to broaden the concepts concerning the language learning and the possibility to set up alternative language instructional strategies in the classroom.

Language processing in the brain.

Language learning is one of the more complex processes in the brain because it involves different areas and connections to work together to process information. Bournot-Trites et al. (1995) expanded on Luria's (1973) perspective of how the information enters and exits the brain as matter of inputs, processing, and outputs by activating different areas and functions. Moreover, Quintanar and Soloviera (n.d) mentioned that some psychophysiological factors are connected when the information enters the brain, such as the hearing system, mobility, lateralization, and the visual system. Furthermore, Vacate (1985 as cited in Vocate, 1990) postulated that Luria's arguments stated a position in which brain's work was impossible without the spoken language due to the diverse features that language provides to the brain. The synergetic relationship takes the human brain from a physical to a social interaction experience. In the end, the relationship between language and the brain is structured by features such as,

input-processing-output (Bournot-Trites et al., 1995), psychophysiological factors (Quintanar & Soloviera, n.d.), brain-spoken language and language processing in the brain (Vacate, 1985 as cited in Vocate, 1990). Consequently, the brain's process to channel the language needs to be described to understand how the areas of the brain are activated when perceiving and external stimulus.

The language as an external factor is perceived in the brain by the senses. Tang (2018) has conceived the Luria's (1973) position regarding the three ways the brain perceives information. The first way is the input that represents the receptive language. The second way is the processing, integration, and analysis of information. Finally, the third way is the output that involves the expressive language. The receptive language involves two physiological senses of hearing and sight, essential for listening and reading respectively; meanwhile, expressive language requires mobility that is speaking and writing (Navarro, 2015). Moreover, Virglioni et al. (2005 as cited in Salazar, 2016) considered the Goodman's psycholinguistic model (Al-Fahid, 2000) to define language as the interactive process between language and thinking in which comprehension is based on the oral, syntactic, semantic, and phonological language that the individual owns. Regarding the Luria's (1973) neuropsychological theory and the Goodman's psychological model (Al-Fahid, 2000), the brain and the language interactions are essential to process the information that enters throughout the senses.

Considering the linguistic features of the language, four processes influence the comprehension of the input, perceptive, lexical, syntactic, and semantic processes (Salazar, 2016). The perceptive process involves the capacities that an individual owns to identify letters, words, graphemes, images that composed the language and are perceived through the visual system (Navarro, 2015). Moreover, Curzan and Adams (2012) described lexical and syntactic

processes as features related to words while syntax process deals with the combination of words to compose phrases, clauses, and sentences in a logical way. Likewise, the semantic process involves the meaning of the words, phrases, clauses, and sentences in the language (Cursan & Adam, 2012). The linguistic features of the language, such as lexical, syntax, and semantic are perceived by the visual and hearing systems. However, they are processed in the left hemisphere in the occipital lobe, Wernicke's area, Heschl's gyrus and the Broca's area (Navarro, 2015). To contextualize the previous explanation, consider a sound traveling through the ears to get to the Heschl's gyrus where the stimulus is perceived, and then the sound goes to the Wernicke's area in order to become a meaningful linguistic unit, or a visual stimulus that goes from the eyes to the areas 17, 18, and 19 in the occipital lobe to get the meaning in the Wernicke's area (Salazar, 2016). For instance, when an individual would like to say a word, the expressive language works throughout the Broca's area in which the spoken language is host with linguistic codes and executive physical functions (Navarro, 2015). This example provides a general overview of how the brain distinguishes and processes some external language stimuli by activating different areas to work together.

To summarize language and brain are connected and work together to channel information and comprehension. Some theories like Luria's (1973) model have indicated that brain activates with inputs and works simultaneously to transmit and to get outputs in the information. Moreover, the Goodman's psycholinguistic model (Al-Fahid, 2000) has suggested some linguistic features that interact in the brain such as oral, syntactic, semantic, and phonological. Finally, Navarro (2015) provided a brief explanation of how the brain's parts identified and processed some features of the language. The processing of the language in the

brain is an opportunity to learn more details, such as areas, localization, and functions of the human organ that can be significant to the language teaching in the classroom.

Brain areas involve in the language processing.

The human brain is an organ able to store and process information from a language in a significant way (Oghyanous, 2017). For this reason, recognizing the brain's parts and functions is meaningful to understand the language processing in each part of the brain. Sousa (2011) stated that producing an oral sentence involves the work of different areas of the brain:

The left hemisphere is home to major components of the language system. Broca's region is believed to be responsible for processing grammar and vocabulary; Wernicke's area is a part to process sense of meaning. However, the emotional content of the language is governed by areas in the right hemisphere. (p. 9)

Moreover, Jensen (1998) described the four lobe divisions of the brain and the key functions of each. The four lobes, frontal, parietal, occipital and parietal, play a key role in the learning process. Figure 1 (Jensen, 1998, p. 9) displays each lobe and the function used to process information. Similarly, the exchange of information between the right and the left hemispheres makes the language learning process more complex than any other type of learning activity (Magalhães, 2019). The following images illustrate the brain areas and their functions. Figure 1 illustrates the brain structures and their functions in the left hemisphere although some parts, such as Wernicke's area, the occipital lobe, the brain stem, the temporal lobe and the Broca's area, were labeled in order to highlight the parts that Luria's (1973) theory described in the previous section. Moreover, Figure 1 shows some other functions that are pivotal to language processing, such as memory (temporal lobe), consciousness (brain stem), problem solving,

concentration, and thinking (frontal lobe). Consequently, Sousa (2011) reviewed some concepts about the brain parts and the functions and the relationship with the language. Jensen (1998) illustrated the lobes and the functions to process language while Magalhães (2019) commented on the complexity of information exchanged between hemispheres. The previous scholarship reviewed information about the brain's parts, functions, and the relationship with the first language acquisition. Although the brain has some functions and parts that might work differently when learning a second language (Sousa, 2011).

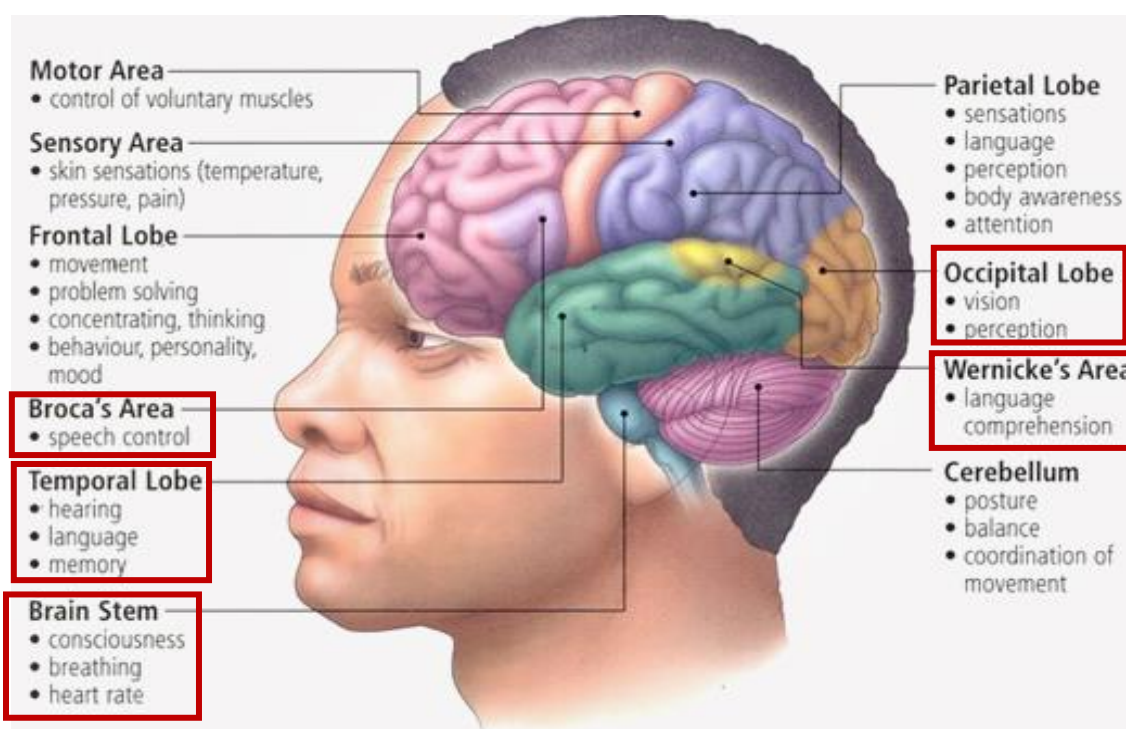


Figure 1. Human brain structure and their functions in human. Label red squares indicate the areas of the brain involved in the processing of language. Adapted from: "Human brain structure and their functions in human body". Adapted from: Human brain facts, 2019. www.humanbrainfacts.org/basic-structure-and-function-of-human-brain.php

Second Language Learning in the Brain

The previous sections of this paper have accounted for the language processing, the brain's parts and functions in the learning of the first language (L1). This section describes the brain's areas that are activated, the effects and changes that the brain goes through and how the bilingual brain works when using and learning a second language (L2). The L2 processing in the brain has more features involved such as the increase of neural activity in the postcentral, temporal, and parietal areas (Sousa, 2011). To determine the increase of neural activity, Kovelman et al. (2008) have made use of the Magnet Resonance Image (MRI) to observe the brain's activity and to explore differences between bilinguals and monolinguals' brains.

A series of questions have been asked regarding the functioning of bilingual and monolingual individuals. One of the questions ponders what the differences between bilingual and monolingual brains are (Sousa, 2011). Before reviewing the literature to obtain a response, some terms are explained in order to contextualize the question. Nacamuli (2015) has defined a bilingual person as someone who has a balanced ability to proficiently use two languages in the speaking, writing, listening, and reading. In the same way, Nacamuli (2015) stated that "knowing two or more languages means that your brain may look and actually work differently than those of monolingual" (p. 1). In fact, research, such as Kovelman et al. (2008), has reviewed in a more detailed way characteristics concerning bilingual brains. The prior scholarship mentioned meaningful aspects, such as, MRI, definition and characteristics of a bilingual person, to understand the L2 processing in the brain.

Kovelman et al. (2008) looked into the brains of 21 young adults by using an MRI. Ten participants were monolingual English speakers, and 11 were Spanish-English bilinguals. The findings revealed that both groups processed the language in the same way, but when bilinguals

used the two languages simultaneously (code switching) an increase in activity in the right hemisphere is displayed in the corresponding of Broca's area (See Figure 2). Moreover, Kovelman et al. (2008) have found that the bilinguals' brains are different from monolinguals' in the nerves network that connects the right and the left hemispheres, which is the area of the corpus callosum. According to Kovelman et al. (2008) the corpus callosum area holds more neurons in the bilinguals' brain because it seems to be larger than in the monolinguals' brains.

The finding about the differences in the nerve networks in both hemispheres by bilinguals (Kovelman et al. 2008) was also corroborated by other research. Li (2017) conducted a similar study and found that anterior cingulate cortex (See Figure 3), located in front of the corpus callosum, increased the volume. The anterior cingulate cortex assists bilinguals in monitoring which language to speak, helping to avoid the intrusion of the other language (Li, 2017).

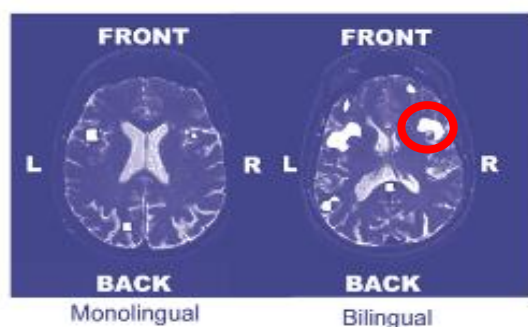


Figure 2. MRI image of monolingual and bilingual brains, Red circle displays the area activated in Bilingual brains. Adapted from: "Are monolingual and bilingual brains different?" by Sousa, 2011. <https://www.worldcat.org/title/how-the-ell-brain-learns/oclc/826659713/viewport>

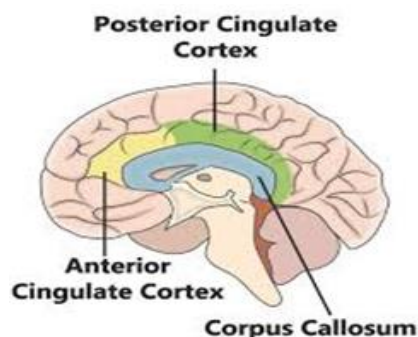


Figure 3. Anterior cingulate cortex and corpus callosum, parts of brain that have more neural networks in bilingual people. Adapted from: "How Mindfulness Practice Affects the brain" by Fraser, 2016, Present source, p. 4. <https://www.presentsource.com/wp-content/uploads/2016/05/Mindfulness-Impact-on-the-Brain.pdf>

In addition, Li et al. (2014) have discussed some aspects about the way bilingual and monolingual brains work. Li et al. (2014) stated:

When bilingual brains are compared with monolingual brains, specific brain regions are more active when doing specific linguistic tasks (phonology, orthography, syntax). These

regions become strengthened in terms of the volume of neural substances, i.e. gray matter and white matter. (p. 302)

Finally, Sousa (2011) cited that bilinguals own three classes of neural sites. The first one is the multiuse site where different tasks of the two languages are performed (located in the frontal, temporal and parietal lobes) (Sousa, 2011). The second one is the single-task site that takes one specific task to both languages (postcentral and parietal areas) (Sousa, 2011). The third one is the single-use site that makes one specific task for one single language (frontal, temporal and parietal areas) (Sousa, 2011). Regarding the differences in the bilingual and monolingual brains, Sousa (2011) accounted for some differences in the way bilinguals process the information as well as the changes in the structure of the brain. In a word, recognizing some characteristics of the brain when learning an L2 clarifies meaningful aspects of the learning process in terms of language acquisition and socio-cultural dimensions.

Second language learners' features.

Taking into account Nacamuli's (2015) definition of a bilingual person, it is significant to delve into components that are required when learning a second language (L2). This section accounts for two important elements that a second language learner needs to develop in order to learn the L2. The first element is supported on Krashen's (1982) second language acquisition theories. The second element is related to the socio-cultural factors that goes with the ESL language process. The following discussion aims to broaden the paths towards the use of an alternative teaching instructional approach based on the brain's capacity.

Earlier discussion labeled L2 learning as a complex process due to the increased activity in some brain's parts and functions. The ESL learning process requires a series of components

that the ELL should internalize in order to become proficient or competent ELL. This means that an ELL should have “the ability to use a language effectively and appropriately throughout the range of social, personal, school, and work situations that comprise daily living” (King, 2015, p. 2). To expand the impact of ELLs’ language proficiency within personal, educational, and social environments, some features are examined to know each environment’s contributions to become proficient in L2.

Herrera and Murray (2016) have described Krashen’s (1982) second language acquisition theories that has posited how a second language is acquired and learned. Krashen’s work (1982 as cited in Herrera & Murray, 2016) has introduced a series of hypothesis in order to explain the L2 learning and acquisition processes. Krashen (1982) named the hypothesis as follows: Acquisition and Learning hypothesis, Natural Order hypothesis, Input hypothesis and Affective Filter hypothesis. Krashen (1982) introduced the Acquisition Learning hypothesis by stating that acquiring a language is a natural process that occurs when the target language is used in meaningful interactions. As a result, an ELL needs to receive meaningful language instruction in which interactions are part of the process in order to make the learning a natural process in the classroom (Herrera & Murray, 2016). In addition, the Natural Order hypothesis (Krashen, 1982) indicated that a learner acquired a language in a predictable sequence by using and implementing linguistic features, such as phonemes, morphemes, words, and sentences. Furthermore, Krashen (1982) also introduced the Input hypothesis which notes that an input language needs to be understandable and the input should go beyond the starting point, comprehensible input +1. Finally, the Affective filter hypothesis (Krashen, 1982) proposed that language learning is impacted by affective factors that hindered the processing of information, such factors were anxiety, self-confidence, and motivation. When anxiety is at high levels, self-confidence and

motivation are not stimulated positively, and the learning process is affected due to the learner's emotional barriers (Herrera & Murray, 2016). The Affective filter hypothesis (Krashen, 1982) is connected to the social emotional factors that ELLs hold when facing a new learning environment.

Similarly, new learning environments, such as migrating to a new country or location where the language and culture are different, represent challenging and frustrating situations for some ELLs. The United States Department of Education (2017) has identified some of the challenging and frustrating situations that ELLs face when migrating to the U.S. To describe the challenges and frustrations, the United States Department of Education (2017) has named four core stressors that influence the ELLs' social emotional well-being and the academic performance in schools. The first stressor is the trauma that deals with the experiences related to physical and emotional threats, such as war, persecution, displacement from home, poverty and family-community violence (The United States Department of Education, 2017). The second is the acculturation stressor that involves the experiences that ELLs and their families go through in the new culture (The United States Department of Education, 2017). Some of these experiences relate to "cultural misunderstanding, need to translate to their families, struggles to understand the school routine and system, moving to a new location, finding opportunities of employment, house, transportation, and financial support make up the resettlement core stressor" (The United States Department of Education, 2017, p. 14). Lastly, the United States Department of Education (2017) has noted isolation as the last stressor, which has caused ELLs and their families experience episodes of discrimination, harassment, and loss of social status that affect social emotional well-being. Consequently, identifying some factors and features that interfere the

ELLs' social emotional well-being aim to deduce the non-academic challenges and frustrations that take place during the ESL learning process.

The previous scholarship, Krashen (1982), Herrera and Murray (2016) and the United States Department of Education (2017) accounted for more details that ELLs and their families experience when enrolling at a U.S school district. Krashen (1982) showed that learning a second language had different stages that started from a learning a language as a natural process to impact on the affective dimension. Likewise, Herrera and Murray (2016) mentioned factors, such as anxiety, motivation, and confidence that interfered in the L2 learning process. Similarly, the United States Department of Education (2017) indicated core stressors that influence on personal and families' socio emotional well-being. Therefore, ELLs' academic dimension goes along with the brain-language relationship, the ESL learning process, and the socio-cultural factors. To make the ELLs' academic dimension successful, instruction should provide alternative teaching scenarios that support ELLs in the ESL learning process. One possible alternative teaching instruction scenario is the BBL approach.

Brain Based Learning

Learning and teaching ESL require the use of diverse strategies in order to make the processes successful (Moghaddam & Araghi, 2013). The BBL approach can be an alternative instructional and learning approach to support ESL learners and educators. Jensen (2005) has stated that brain-based teaching promotes a meaningful education that involves an ongoing and purposeful environment where instruction and curriculum strategies reach every student successfully. The BBL approach is described from the definition, characteristics, and the

importance of its implementation in the classroom. This scholarship aims to understand the relevance of BBL as an alternative instructional approach in the ESL classroom.

Brain-based education is defined as the engagement of strategies and principles resulting from the understanding of the brain's parts, functioning, and processing (Jensen, 2008). In a different report, Jensen (2005) considered that "BBL integrates cutting-edge neuroscience with practical, user-friendly classroom strategies, to overcome challenging teaching environments such as poverty, AD/HD helping to create a high performance school environment" (p. 49). To develop a high-performance educational environment, the BBL approach (Jensen, 2008) includes a series of principles that direct educators to set up a suitable learning environment.

Ramakrishnan (2013) has stated that BBL (Jensen, 2008) includes twelve principles that describe the way the brain works better and the positive impact of their use in classroom. Jensen (2008) stated that "learning involves the whole structure of the brain, emotions are patterning, search for meaning is innate, and learning requires focus attention and peripheral perception" (p. 236).

Brain-based learning's instructional strategies help educators and students promote language skills in the classroom. Ogghyanous (2017) figured out the impact of BBL by analyzing the effects of the brain-based teaching on young English as foreign language (EFL) learners' self-efficacy. Self-efficacy was defined as "people's decision of their abilities to form and perform sequences of action required to achieve the selected kinds of performance" (Ogghyanous, 2017, p. 158). The study included three pivotal instructional techniques in the lesson plans derived from BBL: Relaxed Alertness (RA), Orchestrated Immersion (OI), and Active Processing (AP) (Ogghyanous, 2017). Ramakrishnan (2013) has described RA as a stress-free environment where a challenging learning atmosphere takes place. Thus, Ramakrishnan (2013) has defined OI as an educational environment where students experience the learning by

interacting with reality. Finally, AP gives the learner the opportunity to interact with the learning by knowing and understanding how the information is perceived, processed, and internalized in the brain (Ramakrishnan, 2013). In the study, Oghyanous (2017) provided 90 participants with positive and encouraging feedback, breathing exercises to reduce stress, and formal language assessments. The findings displayed a positive effect on self-efficacy for EFL learners and better performance on the test in contrast to the non-experimental groups. This study aims to identify the features of BBL approach RA, OI, AP and the impact these features have in an EFL classroom. As a consequence, BBL approach can be an alternative instructional approach in the ESL classroom due to the positive impact on self-efficacy and test performance.

In addition, Lombardi (2004) has recommended the BBL approach to teach ESL due to the fact BBL involves assignments in which learners are engaged to use both hemispheres of the brain. To illustrate, Lombardi (2004) has pointed out cross-disciplinary curriculum that allows ELLs to learn math by using arts or music to teach physics. These kinds of cross-disciplinary tasks involve the parts of the brain to work together by demanding the left hemisphere to process language and the right hemisphere to process emotions and talents to strengthen learning skills (Lombardi, 2004). Furthermore, Moghaddam and Araghi (2013) have stated that a language classroom cannot only be focused on linguistic and communicative competences, but successful language classroom include engaging tasks that involve physical body movements, dancing, manipulating clay, molding, singing, and other kinds of activities that support the brain to store information in the long-term memory.

Consequently, Jensen (2008) has considered BBL as a meaningful approach to integrate the functions and parts of the brain to promote authentic learning opportunities. In addition, Ramakrishnan (2013) provided an explanation of some features such as RA, OI, AP of BBL

learning. In the same way, Oghyanous (2017) displayed the positive effects BBL on EFL learners' self-efficacy. Finally, Lombadi (2014) suggested BBL as a relevant instrument to teach ESL by promoting meaningful activities that involve physical activity. Based on the research by Oghyanous (2017), Lombadi (2014), Ramakrishnan (2013) and Moghaddam and Araghi (2013), BBL can impact L2 learning positively because of the integration of brain and language features in the curriculum.

Conclusion

This section reviewed the literature related to the BBL approach as an alternative instructional approach in ESL classrooms. In the first part, some scholarship looked into theories that highlighted the relationship between the brain and the language. Some theories such as Luria's (1973 as cited in Mikadze, 2014) neuropsychological theory explained the importance of the brain's parts and functioning when processing information. Moreover, some parts of the brain, as well as their functions, were described in order to understand the way linguistic features were processed in the brain. Consequently, a review of the literature about the way a L2 processing in the brain was examined. Authors such as Krashen (1982), Sousa (2011), and Nacamuli (2015) contextualized the literature by providing hypotheses of L2 acquisition, the differences between bilingual and monolingual brains, and the definition of a bilingual person. Finally, the brain-based learning approach delved into the definition, the characteristics, and the impact on ESL learning. The literature of BBL approach has suggested the importance of including challenging tasks that involve physical movement, cross-disciplinary curriculum, real learning experiences, and so forth in order to guarantee successful learning environments. This

chapter helped to recognize the important aspects of the brain, language and learning in the trend to propose an alternative instructional approach such as BBL in the ESL classroom.

Chapter Three: Project Design

The experience of teaching and learning an L2 involves challenging situations that should be approached properly in order to assist ELLs in achieving learning goals successfully.

Teachers are responsible for delivering curriculum and doing so in a way ELLs understand the content effectively (Sousa, 2011). Content teachers are skillful at teaching their core areas, but some of them are not aware of ELLs' language, learning and socio-cultural needs (Marshall & DeCapua, 2014). In addition, instructors use resources that provide strategies that support linguistic and content areas and that take for granted the capabilities of ELLs' brain and their learning styles (Jensen, 2008). For these reasons, "teachers need to be knowledgeable about the scientifically based evidence that underlies their instructional decisions by understanding how the brain of an ELL deals with the linguistic reorganization needed to acquire another language" (Sousa, 2011, p. 3). Consequently, alternative instructional and learning instruments are necessary to guide ELLs and teachers in addressing language learning and instructional challenges in the classroom.

A handbook based on BBL approach is a convenient tool because it allows instructors to become aware of the ELLs' cognitive, emotional, and cultural challenges while learning English and content at the same time (Miley et al., 2009). Moreover, the BBL handbook gives teachers and students "motivating, positive activities and strategies to maximize learning and teaching while discovering the ways their brain learns best" (Moghaddam, & Araghi, 2013, p. 55). Furthermore, El-Henawy (2018) stated "brain-based teaching, referred to as brain-compatible or brain-friendly, is evolving to use knowledge about the brain in order to design and implement developmentally appropriate practices in the classroom" (p. 117). When instructors take into account how the brain uses its capacity to

process and perceive information, instructional practices based on BBL can be implemented in the curriculum. Instructors and ELLs are aided through the use of tools that deliver lessons and help to process and perceive information in a more meaningful and effective way.

As a final product of my project, the BBL handbook used to teach ELLs in the classroom contains information related to the brain's structure and functions, the information processing, characteristics of ELLs, and BBL features and strategies to implement in the classroom. In the first section, teachers and ELLs have the possibility of identifying aspects of the brain, such as the hemispheres, the lobes, the location of areas, and functions related to language learning. Moreover, the section also describes the sight, hearing, smell, touch, and taste senses and their implications to the L2 learning process. For example, teachers know that Wernicke's area deconstructs linguistic features to help understand the language, but Broca's area reconstructs these features to prepare an oral response and to help ensure that the sounds are perceived by the hearing sense (Sousa, 2011). Lastly, the BBL handbook in the first section contextualizes the instructors and ELLs with pivotal features about the brain's structure, functioning, and the senses. After recognizing the areas and functions of the brain, teachers and ELLs proceed to the second part of the BBL handbook.

In the second part, the BBL handbook illustrates the way the information is perceived and processed by the senses and the corresponding area in the brain. For instance, teachers gain knowledge about how a visual stimulus travels through the eyes and is perceived in the occipital lobe where the 17, 18, and 19 Brodmann areas (Brodmann, 1909) interpret the stimulus. The perception of the information process is vital to understand how the L2 skills, listening, speaking, writing, and reading are developed and encouraged. "Learning an L2 recruits brain regions not generally involved in native language acquisition" (Midgley, Holcomb & Grainger,

2009). Moreover, research into ELL brain function has shown that mental activity can be different when processing language as compared to native speakers, because some areas of the brain are activated separated from L2 to L1 (Bloch et al., 2009).

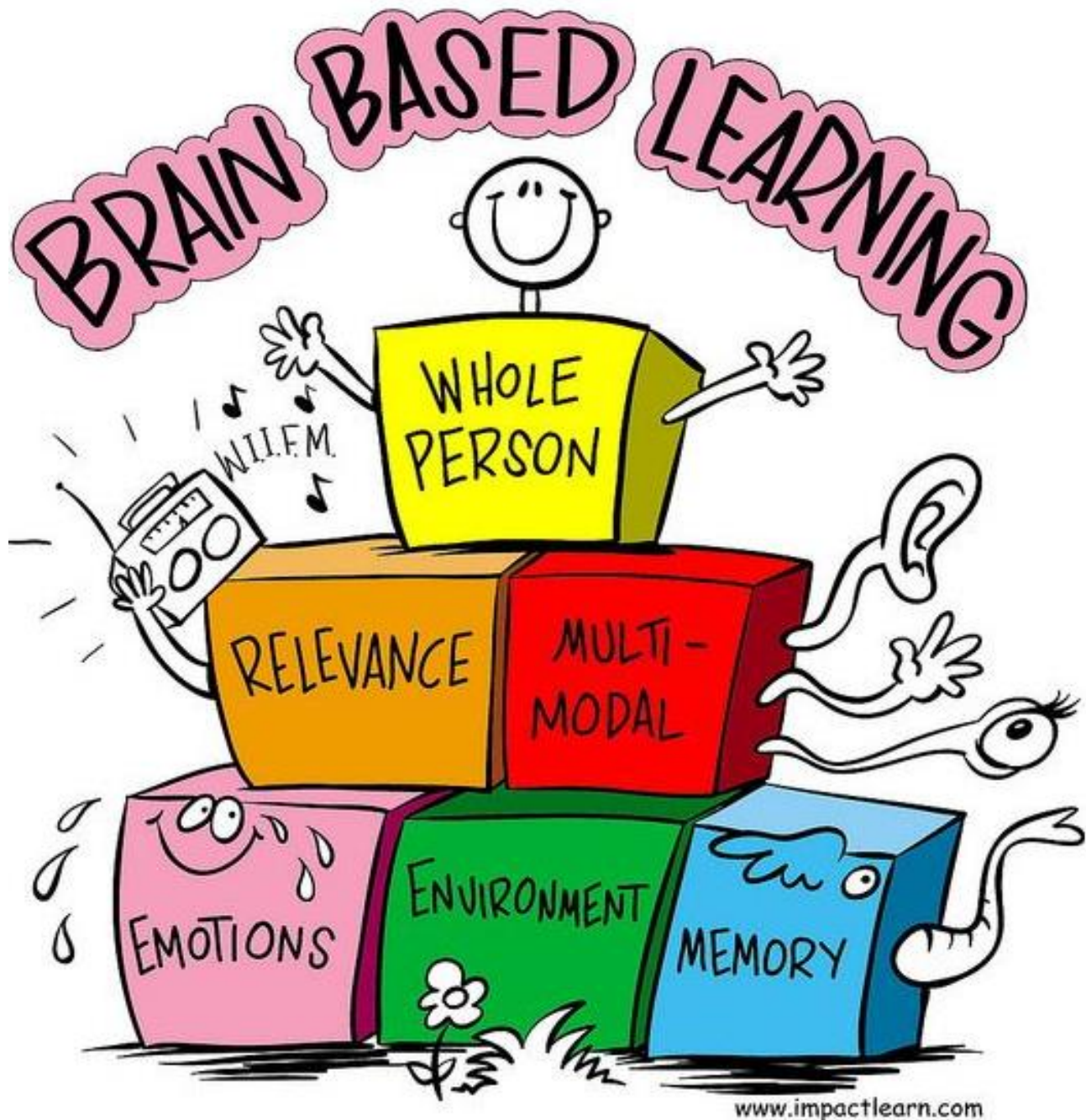
In the third section, readers are able to find relevant aspects about ELLs. This section accounts for details related to features, behaviors, learning, and socio-cultural needs that ELLs get when enrolling into a district school system in U.S. This allows teachers to “have a deep understanding of the mental demands these students face in order to adjust their curriculum and instruction” (Sousa, 2011, p. 31). Understanding the ELLs’ disadvantages allows teachers to figure out ways to improve their curriculum and instruction regarding BBL. For example, teachers know that an ELL newcomer goes through a silent period during the first months of school until they feel comfortable in the new cultural and academic environment (Herrera & Murry, 2016). Consequently, teachers are knowledgeable about the disadvantages and ELLs’ profiles in order to consider to use alternative teaching and instructional approaches, such as, BBL approach.

In the fourth section, some features of BBL approach are accounted for teachers and ELLs to get familiar with important terms when implement it in the classroom. The BBL handbook describes planning strategies, activities, and recommendations to be included in the curriculum and in the classroom. For example, teachers and ELLs can train attention and listening skills by leading an activity to identify mysterious sounds. The teacher can play audio with different sounds and ELLs can respond by filling out a chart by guessing the details of the sounds, (animal, a word, a noise, etc.). Teachers can make use of the content of the class to include sounds (e.g the roar of a lion in a science class); then, ELLs share their guessing, and teachers provide the correct answers.

In summary, challenging situations when learning an L2 can be addressed by using alternative instructional tools in the classroom. The BBL handbook to teach ELL is a convenient resource because teachers and ELLs are able to recognize information about the brain and its functioning. The BBL handbook contains four sections that illustrate teachers and ELLs with information about the areas brain, the senses, and the functioning. Furthermore, the second section describes the perception and information processing in the brain while the third section describes s ELLs' profiles, learning and socio-cultural needs. The final section explains features of BBL approach and activities to be used in the ELLs' classroom. The purpose of the BBL handbook is to promote alternative teaching instructional tools in the ESL classroom that assist ELLs to overcome language, social, cultural, and emotional barriers that impact on L2 learning.

Chapter Four: The Project

BRAIN-BASED LEARNING STRATEGIES TO WORK WITH ELLs



BRAIN-BASED LEARNING STRATEGIES TO WORK WITH ELLs

Table of contents	pg
Introduction	3
Welcome to brain-based learning	4
Section 1: the brain	5
Lobes of the brain	6
Corpus callosum	7
Assessment activity	8
Section 2: how the language is processed in the brain	9
Assessment activities	11
Section3: English language learners' profile	12
Assessment activities	14
Section 4: brain-based learning	15
Brain-based learning principles	16
BBL instructional strategies	17
BBL learning strategies to work with ELLs	18
Socio-cultural activities	19
Language learning skills activities	21
References	27

BRAIN-BASED LEARNING STRATEGIES TO WORK WITH ELLs

Introduction

Learning about the brain brings on positive performances and outcomes to the teacher and students. Teaching and learning a second language (L2) increase the interest to become more familiar with the brain's structural and functioning in order to understand how information is processed and to find out the way the brain learns best. The brain-based learning (BBL) is an alternative to teaching that helps teachers and English language learners (ELLs) understand the brain's functioning and information processing in order to improve English as a second language (ESL) learning experiences. *The BBL Strategies to Work with ELLs* handbook takes the importance of learning about the brain and the influence of using strategies based on the mental organ to promote ESL learning in the classroom. The handbook contains four sections that describe the brain's parts and functioning, the information processing, the ELLs' personal and socio-cultural profiles, BBL features, and strategies to work in the classroom. The objective of the handbook is, not only to provide information and strategies, but also to help teachers and ELLs understand how the brain works when facing learning and socio-cultural challenges in the classroom. The BBL is an alternative teaching instrument to be considered in order to expand the learning opportunities to ELLs.

Welcome to Brain-based Learning



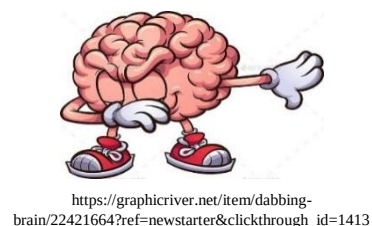
https://graphicriver.net/item/dabbing-brain/22421664?ref=newstarter&clickthrough_id=

Some ESL and content teachers are aware of the diverse challenges that ELLs face when coming into a classroom. A new language, a new socio-cultural environment and a new life are some hurdles ELLs confront in order to fit in the new academic scenario. These challenges make teachers look for alternative teaching instructional strategies to support ELLs in the classroom. Several language learning instruction programs support the teachers' search to fill in the ELLs' gaps, although some difficulties remain and the need to find more instructional alternatives increases.

Brain-based learning (BBL) is an alternative instructional and learning approach that provides teachers and ELLs with opportunities to know how the brain learns best. "BBL education is best understood in three words: engagement, strategies and principles. Brain-based education is the engagement of strategies based on principles derived from an understanding of the brain" (Jensen, 2008, p. 4). Instructors find a series of principles to be implemented in the curriculum and classroom in order to engage ELLs to accomplish language, academic, and socio-cultural goals. To understand how the brains learns best, instructors and ELLs need to know some aspects of the brain's parts, such as the lobes, hemispheres, the functioning, the information processing (specifically the language one), the hearing and visual processes. Once teachers and ELL are aware of some aspects of the mental organ, they are able to recognize the role of human senses in the learning process and the importance of stimulating them since the curriculum. Teachers and ELLs encounter strategies and activities to activate the mental organ and to motivate ELLs. Welcome to Brain-based learning, to explore an alternative teaching adventure to support ELLs.

SECTION 1: THE BRAIN

A note to teachers “There are any number of questions that might lead one to undertake a study of language. Personally, I am primarily intrigued by the possibility of learning something, from the study of language that will bring to light inherent properties of the human mind.” - Noam Chomsky – (Chomsky, n.d.)



The mental organ needs to be considered in the academic environment. As a main instrument of the BBL approach, the brain should be explored in order for teachers and ELLs to become familiar with the parts, areas, and functioning. In this section, readers have the opportunity to get a closer view of the brain by exploring the hemispheres, lobes, parts, and functions to process information.

Hemispheres

The first feature in the structure of the brain is the division. The brain is divided in two hemispheres, the right hemisphere and the left hemisphere. Each hemisphere controls the opposite side of the body and shelters a series of mental, emotional, and abstract functions (Sousa, 2011). The importance of understanding the functions of the each hemisphere assists teacher and ELLs to create activities to foster the functioning of each hemisphere. If a teacher finds out an ELL is good at drawing, the teacher should set up activities to promote the talent of the student by adapting the curriculum projects that involve drawing, creating images, or pictures to describe a process. For example, students can explain the process of the mitosis by creating a cartoon and including key words. Figure 1 illustrates the functions of each hemisphere.

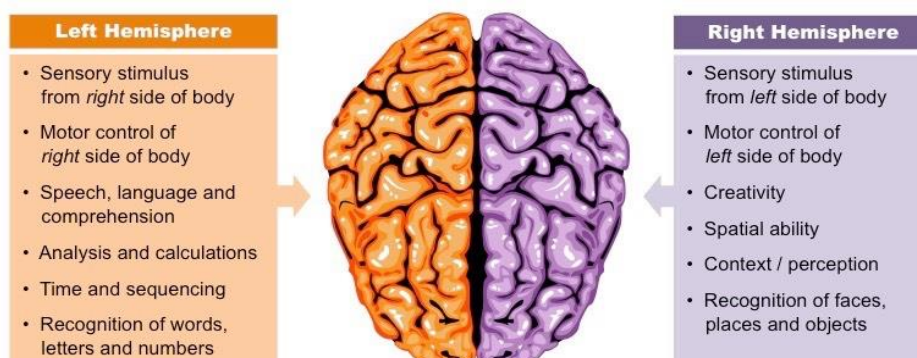


Figure 1. Hemispheres and functions. Adapted from: “Cerebral hemispheres” by Bioninja, 2017
<https://ib.bioninja.com.au/options/option-a-neurobiology-and/a2-the-human-brain/cerebral-hemispheres.html>

Lobes of the brain

The brain is the most intriguing organ due to the diverse functions that take place in it. Jensen (2008) suggested that a person's brain contains around 100 billion neurons, the size and the weight may be different in among people. However, the brain structure and functions do not display differences among humans. The brain's areas are separated by lobes, each lobe carries out a series of functions that allow the whole body work. Understanding the lobes and the functions of the brain permits teacher to enhance learning inputs in order to stimulate the mental process and to activate prior learning experiences. Consequently, teachers may be able to identify some learning difficulties that hinder ELL access to information in a clear way.

The brain is made up by four lobes, frontal, parietal, occipital and temporal, each lobe carries out different functions. The frontal lobe holds memory, behavior, movements, intelligence and personality (Sousa, 2017). Likewise, the frontal lobe is responsible for controlling speech in the Broca's area. The parietal lobe gets functions of sensations, language, perception, attention and body awareness (Sousa, 2017). The temporal lobe holds the language

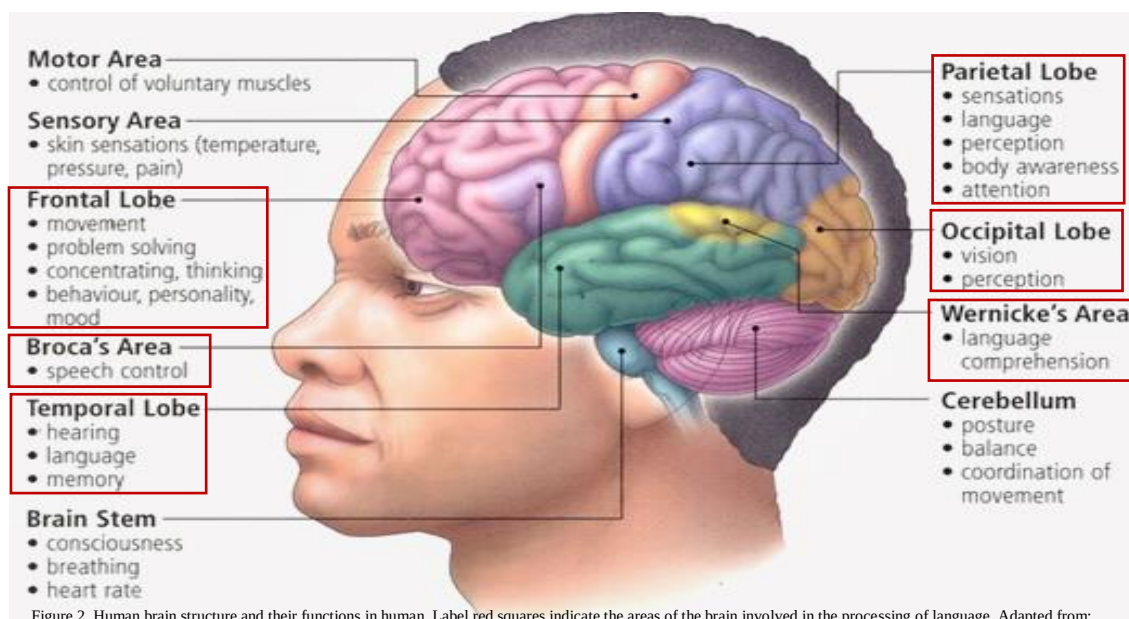
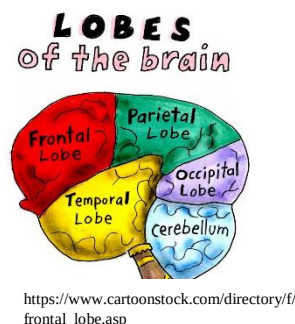


Figure 2. Human brain structure and their functions in human. Label red squares indicate the areas of the brain involved in the processing of language. Adapted from: "Human brain structure and their functions in human body" by Human brain facts, 2019. www.humanbrainfacts.org/basic-structure-and-function-of-human-brain.php

comprehension (linguistic features in the Wernicke's area), hearing and memory. The occipital lobe holds the vision and perception (Sousa, 2017). Figure 2 illustrates the parts of the brain and their functions. The red labeled parts are involved with language processing.

The Corpus Callosum

The Corpus Callosum is located in middle of the two hemispheres. The corpus callosum connects the two hemispheres to communicate, transfer, and process as well as to control coordination of movements of the whole body (Jensen, 2008). In the ESL learning process the corpus callosum helps to transfer linguistic information from the left hemisphere to the right hemisphere and vice versa in order to attribute emotions to the previous or new language learning experiences (Sousa, 2011). This is one of the many functions the corpus callosum does in the L2 learning process. The implementation of encouraging activities in the classroom allows the corpus callosum to strengthen and to grow the structure. This growth impacts on the speed of transferring information which helps ELL to process information in a more accurate and faster way (Sousa, 2011). The implementation of activities

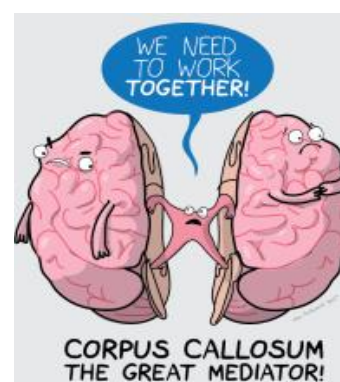


Image the corpus callosum the mediator. Adapted from "that biologist" by: <https://thatbiologist.wordpress.com/tag/corpus-callosum/>

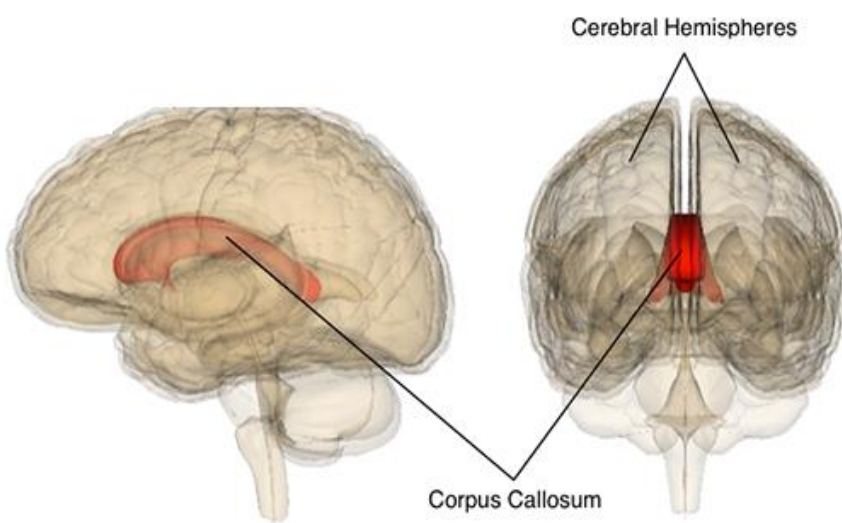


Figure 3. The corpus callosum, location from the frontal and the left lobes of the brain. Adapted from: "Corpus callosum" by Queensland brain institute <https://qbi.uq.edu.au/brain/brain-anatomy/corpus-callosum>

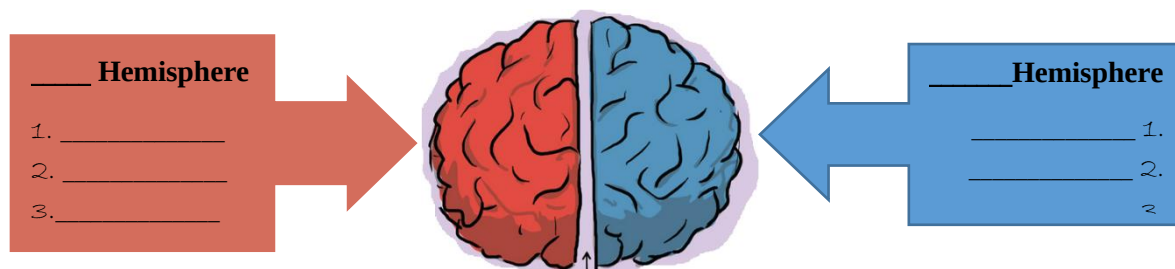
that promote positive emotions in the classroom assist ELLs in increasing the corpus callosum size and activity. Figure 3 shows the location of the corpus callosum.

ASSESSMENT ACTIVITIES:

1. Write the names of the hemisphere and write three functions related to language learning for each.

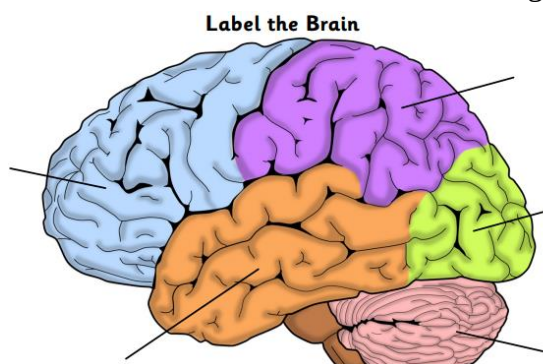


<https://graphicriver.net/item/dabbing->



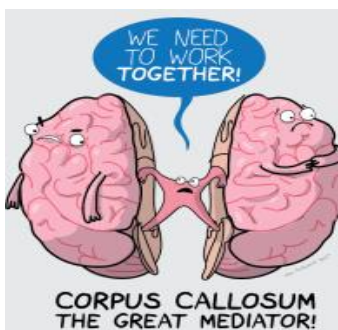
<https://neurosciencestuff.tumblr.com/image/44422894244>

2. Label the lobes of the brain and write one function related to language learning of each.



<http://resources.sparkleboxteacherresources.ltd.uk/11000-12000/sb11585.pdf>

3. Use the image to write two features about the corpus callosum and the influence in the ESL learning process.



<https://thatbiologist.wordpress.com/tag/corpus-callosum>

- a. _____
- b. _____
- c. In the ESL learning process _____

SECTION 2: HOW THE LANGUAGE IS PROCESSED IN THE BRAIN



The language learning process is an amazing phenomenon that involves different parts of the brain to work together. The language processing is held in the left hemisphere after is perceived by the senses, most of the times by hearing and visual senses. Figure 4 illustrates briefly the areas and parts involve in the language processing when the information is perceived by the visual sense. Salazar (2016) described the language processing in the brain by providing more details to expand in the information of the Figure 4. In the first part, the visual cortex or occipital lobe receives the visual stimulus and then it processes the stimulus to the Angular gyrus in the parietal lobe. In the second step, the Angular gyrus responsible for recognizing symbols, graphemes, words, or abstract images, sends the information to the temporal lobe where the Wernicke's area is. In the third step, the Wernicke's area interprets information by decoding the linguistic content of the symbols sent by the Angular gyrus.

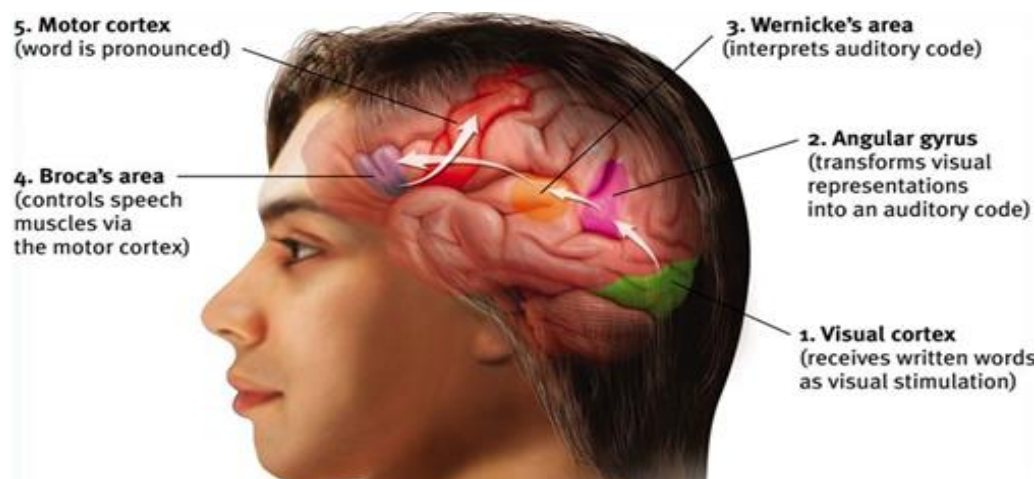


Figure 4. Language processing in the brain. Areas involved and function to process the language, arrows show the sequence of the process. Adapted from: "Brain areas involved in the language process" by Marshburn.
<https://slideplayer.com/slide/2473044/>

The Wernicke area stores the linguistic features of the language such as, grammar units, semantics, phonemes, morphemes, words, letters, and so forth. In the fourth step, once the Wernicke's area interprets the information, the stimulus is sent to the frontal lobe where the Broca's area is. Broca's area codes the information to construct or reconstruct oral responses. So, Broca's area prepares the oral responses by constructing the linguistic structure and sending the information to the motor cortex. In the final step, the motor cortex in the frontal lobe stimulates the speech organs (vocal cords, tongue, mouth, glottis, palate, etc.) to produce the sounds. This general explanation helps to understand the complexity of the language processing in the brain. Moreover, when stimuli are displayed in different forms, such as sounds, reading or stimulus needs to be produced or reproduced orally as the language is processed, which Figure 5 shows. The reading, listening and speaking processes are detailed from the linguistic to brain processing.

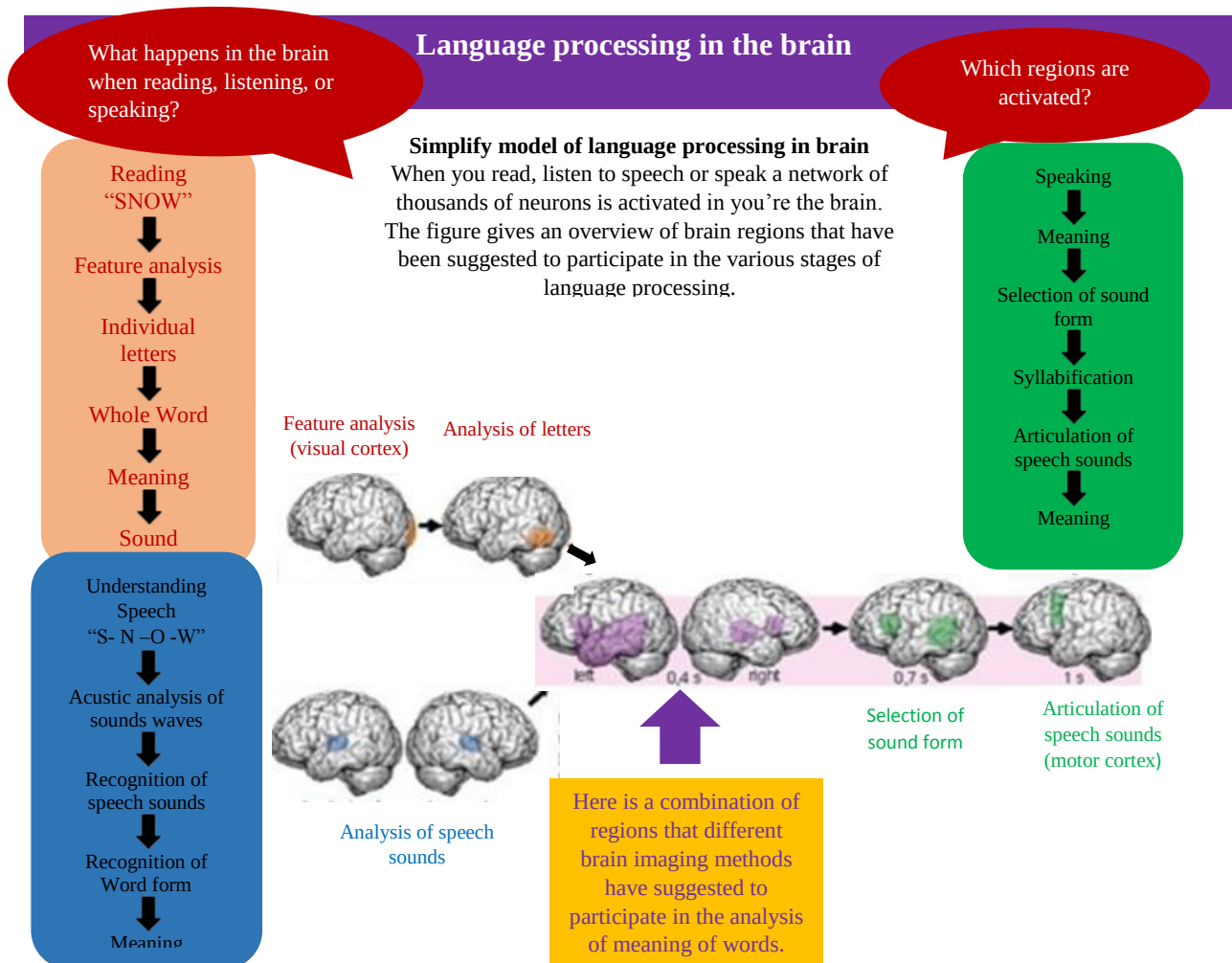


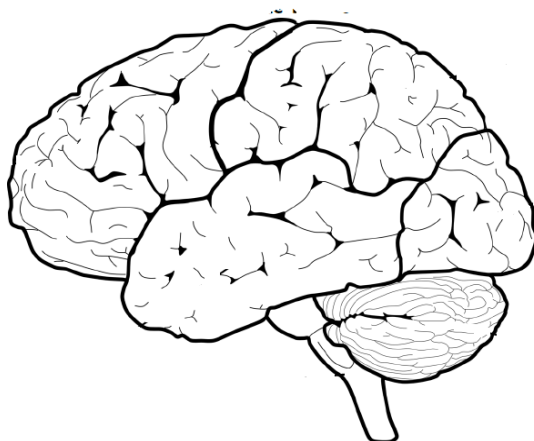
Figure 5. Language processing model in the brain. Reading, listening and speaking language processes are displayed. Adapted from "language brain" by American Tesol institute <https://americantesol.com/blogger/understanding-natural-language-processing-for-translation/>

ASSESSMENT ACTIVITIES

1. Label the areas and the functions related to language processing in the left hemisphere. Then use different colors to identify the regions in where listening, reading and speaking are located.

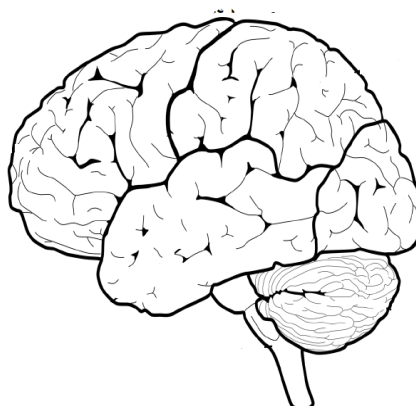


https://graphicriver.net/item/dabbing-brain/22421664?ref=newstarter&clickthrough_id=1413191780&redirect_back=t



<http://resources.sparkleboxteacherresources.ltd.uk/11000-12000/sb11585.pdf>

2. Draw the arrows in the areas and describe the language processing in the brain.



<http://resources.sparkleboxteacherresources.ltd.uk/11000-12000/sh11585.pdf>

SECTION 3: ENGLISH LANGUAGE LEARNERS' PROFILE

ELLs enter to a new educational environment with challenges that teachers should get familiar with. ELL face scenarios with more interracial, cross-cultural and multilingual experiences. Moreover, learning a new language involves academic, social and cultural challenges that demand high mental activities. That is why, teachers should have an understanding of some of the ELLs' needs in order to provide a more accessible instruction in the classroom. When ELLs come into the classroom, they already have established vocabulary and a set of grammar rules for the first language (L1), so teachers should determine the influence of L1 into L2 (Sousa, 2011). ELLs' brain tends to compare or associate aspects of L2 with previous learning experiences in the L1. This process taps into long-term memory storage in order to bring similar past experiences with the new language, this process is called transfer (Sousa, 2011).



https://graphicriver.net/item/dabbing-brain/22421664?ref=newstarter&clickthrough_id=1413191780&r

The transfer process takes place into different ways, positive transfer and negative transfer. Positive transfer assists ELLs with previous experiences that can be associated with the new information. Negative transfer does not provide the enough support to connect new information with past experience, resulting in mistakes and confusions (Sousa, 2011). The transfer hypothesis stated by Cummins (1981 as cited in Herrera & Murry, 2016) suggests that ELLs with literacy in L1 is able to transfer the abilities to L2. Teachers should be aware of the ELLs' past learning experiences in order to contribute to positive transfer or to reduce the impact of negative transfer by setting up activities that make content accessible and understandable.

In addition to the mental to the language transfer process, ELLs also cope with socio-cultural experiences that can develop negative emotional experiences in the brain. The US department of Education (2017) frames the emotional experiences in a core stressors diagram. The core stressors are the results of a series of personal, social and cultural situations that ELLs go up against along the ESL learning process. Figure 6 shows the core stressors diagram suggested by the US department of Education (2017) in which four main areas are explained: acculturation, resettlement, isolation and trauma. The abrupt changes in the environment, linguistic, social and cultural dimensions hinder the ELLs' brain to perceive and process information adequately, for the brain sets up in a survival mode that obstructs the regular flow of the information processing (Jensen, 2008).

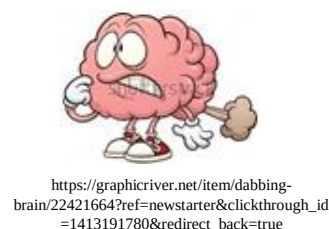


Figure 6 Core stressors. Adapted from: Newcomers Toolkit by the US department of education.
<https://www2.ed.gov/about/offices/list/oela/newcomers-toolkit/ncomertoolkit.pdf>

should implement activities that highlights ELLs' prior experiences, cultural and social background in order to tap into L1 memory and to reduce the core stressors in classroom by setting up a suitable academic learning atmosphere (Herrera & Murray, 2016).

Assessment activity

1. What kinds of challenges do ELLs face when enrolling into a new cultural and language education setting?

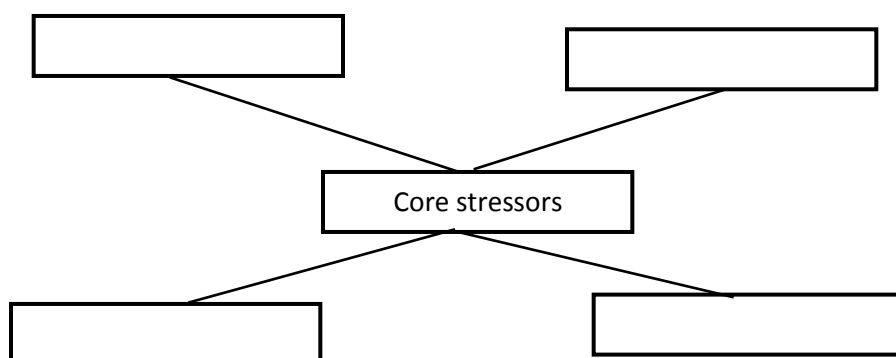


https://graphicriver.net/item/dabbing-brain/22421664?ref=newstarter&clickthrough_id=1413191780&redirect_back=tr

2. What is the transfer hypothesis? How would you use it in your classroom to support an ELL?

3. How would you tap into ELLs' prior cultural experiences to contribute a positive cultural transfer from L1 to L2?

4. Complete the core stressor diagram, then write one specific example to explain each core.



SECTION 4: BRAIN-BASED LEARNING

Creating suitable environments to ELLs make the learning process more effective. Learning about brain parts and functioning is not enough to assist ELLs in the ESL process, so teachers need to take the theoretical framework of the brain to practical teaching strategies in the classroom. Brain-based learning was born when technology to observe and analyze the brain showed up during the 1980's (Jensen, 2008). The need to explore the brain took cognitive scientists such as, Lesli Hurt (1983 as cited in Jensen, 2008), Howard Gardner (1983, as cited in Jensen) to run research to understand the importance of the brain in the education field. One of the Lesli Hurt's conclusion (1983 as cited in Jensen, 2008) in the research was "If we ignore how our students' brains work, we will risk our students' success" (p. 3). This fact opened the path to create or implement alternative teaching instructional approaches such as, BBL.



<https://braintumourbites.com/2018/04/23/th>

"Brain-based learning is defined as the **engagement of strategies** based on **principles** derived from an **understanding of the brain**. Brain based education considers how the **brain learns best**". (Jensen, 2008, p. 4).

Why should teachers need to consider BBL in the classroom?

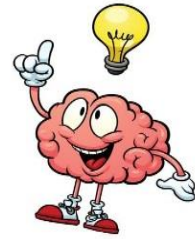


<https://braintumourbites.com/2018/04/23/th>

- To help ELLs find learning styles.
- To reduce stress while learning
- To know mental demands
- To get to know the ELLs' learning and socio-cultural challenges.
- To adapt strategies to the brain's learning processing. (Jensen, 2008)

BRAIN-BASED LEARNING PRINCIPLES

Teachers need to be aware of a series of principles in order to understand brain functioning and learning process to implement BBL in the classroom. The core principles were suggested by Caine & Caine (1991) assist teachers to consolidate the knowledge about the brain and to adapt them into their curriculum.



<https://braintumourbites.com/2018/04/23/th>

1. Brain is a living system
2. The brain is social
3. The search for meaning is innate.
4. Patterning is essential for meaning
5. Emotions are critical to patterning
6. The brain processes wholes and parts simultaneously.
7. Learning involves both focused attention and peripheral perception
8. Learning involves both conscious and unconscious processes.
9. We have two types of memory: spatial and rote.
10. We understand best when facts are embedded in natural, spatial memory
11. Learning is enhanced by challenge and inhibited by threat.
12. Each brain is unique

BBL INSTRUCTIONAL STRATEGIES

BBL contributes strategies to enhance instructional process in the classroom. By implementing the instructional strategies teachers promote new environments in the classroom, encourage ELLs to learn in a joyful way while enhancing memory and self-esteem (Jensen, 2008). The instructional strategies based on relaxed alertness (RA), active processing (AP) and orchestrate immersion (OI), (Caine & Caine, 1991). The following chart gives some details about each teaching principle based on the Caine & Caine's work (1991) Making connections: teaching and the human brain.



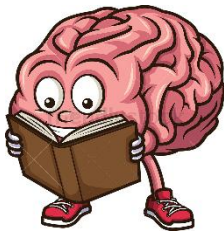
<https://www.dreamstime.com/cartoon-brain-looking-piece-paper-thinking->

RELAXED ALERTNESS (RA): promote a safe learning environment free of negative emotions while setting up a positive challenging learning atmosphere.

ENVIRONMENT



<https://www.canstockphoto.com/relaxing-with-a-glass-of-juice-brain-37777640.html>



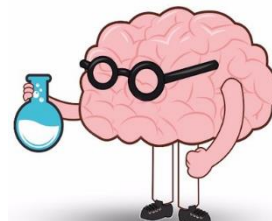
<https://braintumourbites.com/2018/04/23/th>

ACTIVE PROCESSING (AP): provide the learners with opportunities to know the brain and how the information is processed, while the learners identify, consolidate and relate the new information with previous concepts.

KNOWLEDGE OF THE BRAIN

ORCHESTRATE IMMERSION (OI): involve learners in real educational experiences that allow them to live the learning and become the center of the process.

EXPERIENCE



<https://braintumourbites.com/2018/04/23/th>

BBL LEARNING STRATEGIES TO WORK WITH ELLs

Learning strategies give teachers and students instruments to facilitate the access to process information in order to impact on long term teaching (Jensen, 2008). BBL holds a list of learning strategies that can be adapted to any learning atmosphere and to ELLs' language proficiency, ESL learning can draw on BBL learning strategies in order to assist ELLs in the language learning process. The some of the strategies have been adapted from sources such as, *Brain-Based Learning Approach* (Jensen, 2008), *How the ELL Brain Learns* (Sousa, 2011), *The Skillful Teacher* (Saphier, Hayley-Speca, & Gower, 2018), and *Mindup Curriculum* (Scholastic, 2011). Other strategies have been included as a result of the experience as a magister in Neuropsychology and education and an ESL. As it was mentioned before, BBL is an alternative teaching instructional approach that can be used to complement or guide other instructional methods in the classroom. One pivotal aspect is that the teachers should be aware of the importance of following the instructional approach strategies RA, AP and OI (Caine & Caine, 1991) in order to consolidate a concrete base towards BBL. Due to the limited extension demands of the current paper, the number of strategies are reduced and only include socio-cultural and language skills areas.



<https://braintumourbites.com/2018/04/23/th>

Talking	Emotions	Visuals	Chunking Information of the lesson	Movement
Shake it up: change routine of the class	Brain needs oxygen	Brain breaks	Make connections	Feedback
Music	Acronyms	Drink water	Time for reflection	Energy level
Space	Location	Positive Environment	Optimism	Choices for learning
Anticipation	Meaningful learning.			

(Caine & Caine, 1991)

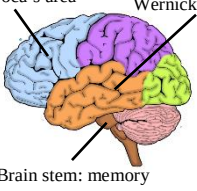
Socio-cultural activities

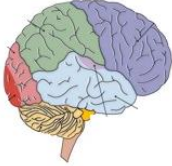
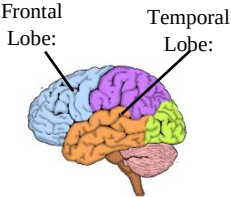
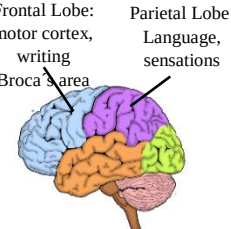
Creating a suitable environment, (RA), is one of the instructional strategies BBL recommends. One of the first steps to set an appropriate environment for ELLs is to get to know the students' personal, social, and cultural background (Sousa, 2011). To collect ELLs' data, teachers can run pre-assessment surveys (See Appendices A & B) in order to learn about linguistic background, academic readiness, metacognitive skills, and personal interests (Saphier, Hayley-Speca, & Gower, 2018). Learning about your ELLs helps to set up goals to meet students' needs, adapt the curriculum to overcome language barriers, strengthen cultural proficiency during instruction time, build personal relationships, and to encourage students (Saphier, Hayley-Speca, & Gower, 2018). These strategies assist ELLs to reduce core stressors (U.S. Department of Education, 2017) such as, acculturation (cultural learning), trauma (emotion regulation, social support and environment), and isolation (alienation and loneliness).



<https://braintumourbites.com/2018/04/23/th>

Besides collecting data from ELLs, teachers should promote a positive atmosphere during instruction time by using the data collected to transform the classroom into a relaxed environment and by building community. The following chart displays some strategies to set up a positive learning environment in the classroom and to build a learning community.

Strategy	RA Environment	AP Knowing the brain	OC Experience
Building community	Description	Teach your ELLs	How to implement it.
Business cards	Have ELLs write their names on an index card in the center and on each corner ELLs should write a talent nobody knows, country and city, a typical food from their country, colors of the flag.	Frontal Lobe: Broca's area Temporal Lobe: Wernicke's area  Brain stem: memory Right hemisphere is stimulated by regulating emotions.	To stimulate participation during instruction time, teacher elicits one of the ELLs' business card, reads the name and one corner aspect. The ELLs whose name is called out should report the aspect and provide to answer the question teacher asks. This strategy can be used once per class to avoid repetitive sequence.

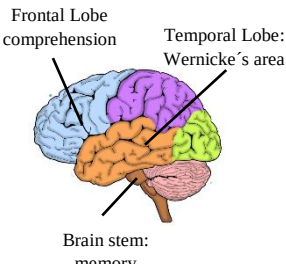
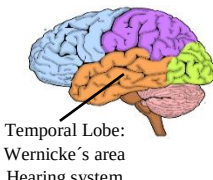
Birthday posters	Place a poster on a wall in the classroom and have Ells to write their names on the month and the day of their birthdays.	 Right hemisphere: Emotional thought Holistic perception. Imagination	When an Ell has a birthday, have the learner to share the way they celebrate birthdays in the countries. Try to involve parents in the celebration by having them to bring any kind of food. Use the birthday's dates to promote interaction by having ELLs to work with a partner with a similar or close date.
Clock buddies	Provide a worksheet with a clock (see Appendix C). Have Ells to find a partner in each time of the clock and write the names. Each Ell should have a partner in each time of the clock	 Right hemisphere: Emotional thought Social interaction	Use this strategy to promote interaction by having students to find a clock buddy. For example, say to your ELLs, work with your 4 o'clock buddy and ask him/her how his/her your weekend was and then check the answers of the assignment.
My profile	Have ELLs to write a personal profile poster by using keywords. Information should include name, country, and flag of the country, capital city, foods, picture, hobbies or leisure activities.	 Right hemisphere: Artistic skills Creativity	During instruction time, have ELLs to explore any feature of a partner by exploring the posters. Then, Ells go and share information with the poster partner. Use this activity to have a break during content instruction. Have students to use prompts such as, A- Where are you from? B- I am from _____. In order to assist limited English proficiency students. Moreover, teacher should have student to update their profiles by including academic, language, social, or cultural achievements.

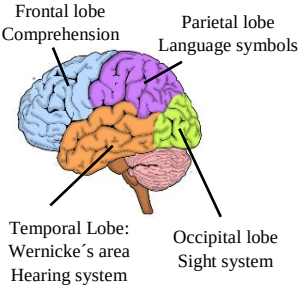
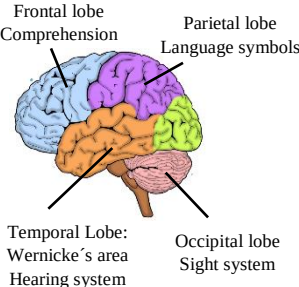
Language learning skills activities

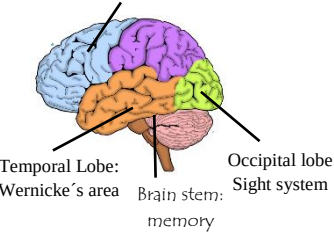
Language learning processing involves the left hemisphere's work mostly. The following strategies suggest activities to promote listening, reading, speaking and writing skills. Sousa (2011) described the areas and the process that goes through each region to process the L2. Listening skill is held in the temporal lobe and involved the Wernicke's area, hearing system and memory. Speaking is in the frontal lobe and involved the Broca's area and the motor cortex to produce oral responses. Reading skills is more complex, because it involves sight sense, occipital lobe, parietal lobe and finally the temporal lobe. Writing skills also involves the same parts of reading in addition to frontal lobe, reasoning, linguistic construction and the promotor area.



<https://braintumourbits.com/2018/04/23/th>

Strategy	RA Environment	AP Knowing the brain	OC Experience
Listening	Description	Teach your ELLs	How to implement it.
Cognates	Have a list of cognates in ELLs' L1 (Sousa (2011) noted Spanish is language with the highest native speakers in the school system in US) that may be related to the content of the lesson. This strategy is very useful with newcomers.	 Listening is located in the temporal lobe. Hearing system, Wernicke's area, and memory (L1) are involved. Tap into L1's language memory.	Locate a word wall and pronounce the words, have ELLs to listen to and then repeat. After that have ELLs to work with a clock buddy and come out with the differences in the spelling in the language. Finally, have students to practice by repeating the words to their partners. If you are a content teacher, find cognates related to the lesson and during instruction time say the content word in Spanish.
Songs	Prepares a playing list (5 songs) with easy lyrics songs that include words related to content or the lessons to be taught. Make flash cards and locate them on the word wall (songs of the	 Temporal Lobe: Wernicke's area Hearing system	Present the vocabulary related to the songs while students are working on the assignment play the list and have them. When monitoring have students to look at the word wall and repeat the words. At the end or beginning of the class you can have some minutes to play a song to release or start the class.

	week). You can also use songs with code switching lyrics.	Right hemisphere  Emotional thought Music	
Reading - Speaking or Writing.	RA Environment Description	AP Knowing the brain Teach you ELL	OC Experience How to implement it.
Modify readings	Adapt reading to ELLs' needs by reconstructing the text with vocabulary according to the L2 proficiency level. Illustrate the content with visual aids and sounds if possible.	 Tell your students reading requires a high mental process, because it involves all the lobes and two senses to work simultaneously.	Go over pre-reading strategies by exploring pictures, have ELL to report simple aspect such as, location, emotions, activities, colors, situation, etc involved in the pictures. Then, work on while reading strategies by having Ells to read aloud with a clock buddy. As an outcome have students to draw a comic to illustrate the story, or report the main ideas in a tv commercial or a breaking news report.
Point to the words are reading the text	Place posters with articles about the content around the classroom. Try to make the colorful and eye-catching.	 Tell the students that this activity encourages eye movement. The information that comes to the occipital lobe is wider when there is a higher visual perception. When the eye movement is stimulated more information is sent to the occipital lobe to be processed.	Have students to make up groups of 3 students based on birthday's dates. Then, ELLs should read the text by point to the words while reading, one member in the group makes sure the reader does do not move his head while reading, just the eyes. The other member writes key words. After that members switch roles until all of them have read. Finally, ELLs discuss the ideas and vocabulary they found. Teacher wraps up using the ideas of the reading and the feedback about eye movement.

Speaking – writing	RA Environment Description	AP Knowing the brain Teach you ELL	OC Experience How to implement it.
Tell me a story	Have ELLs to prepare a story based on legends, myth or traditional stories from their countries. ELLs should bring pictures and write key words to decorate the classroom.	Frontal lobe :Broca Area – motor cortex area oral response  Temporal Lobe: Wernicke's area Brain stem: memory Occipital lobe: Sight system Right hemisphere  Emotional thought	After modeling, prepare a check list with criteria to tell the story. ELLs with LEP can use key words and tell the story using cognates or short phrases. Work with stations and have students to share their stories. At the end of the activity have ELLs to point to the pictures around the classroom and name any feature related to it.

Chapter Five: Conclusion

Teaching and learning ESL are complex processes that require a suitable use of strategies in order to make processes successful. BBL approach is an alternative teaching instrument to promote learning and teaching strategies based on brain's functioning. Understanding the brain's parts and functions is essential in order to get a closer view to BBL. Theoretical approaches, such as Sousa (2011) and Jensen (2008), base their views on brain functioning by checking the how the information is processed and the effects on ESL learning process. This section summarizes significant aspects of the paper by highlighting details of BBL as a teaching tool in ESL classrooms and by reflecting upon the experience of researching on a meaningful topic in the TESOL field.

The BBL handbook for teaching ELLs project is an alternative instructional tool to assist teachers in the classroom. The handbook's theoretical part is supported on the Luria (1981) neuropsychological theory which highlights the simultaneous work of the brain's parts when perceiving and processing information. Taking into account the simultaneous work of the brain view, the project includes significant information for teachers to know the brain's parts and functions. The first section of the handbook helps teachers to know the brain by displaying information regarding the hemispheres, the lobes, and their functions. The second section accounts for the language processing in the brain and the parts involved in the process. This section helps teachers understand the complexity of language learning process by detailing how an external stimulus is perceived in one part of the brain and processed in another part of the brain (Sousa, 2011). Consequently, teachers have the opportunity to get to know the ELLs' personal profiles and the socio-cultural

challenges that affect the ESL process. Thus, teachers have the possibility to know the core stressors (U.S Department of Education, 2014) that affect the ESL process. In the last section, teachers find the BBL principles, instructional strategies, such as relaxed alertness, active processing, and orchestrated immersion (Caine & Caine, 1991). Lastly, the project suggests some socio-cultural and language activities to be used in the classroom regarding the BBL criteria.

The BBL strategies to teach ELLs handbook is an alternative instructional tool to assist teachers and ELLs in the ESL teaching and learning processes. This alternative tool allows teachers to know the brain, functions, learning styles, and strategies to draw on when facing a challenging learning or sociocultural situation. ELLs can benefit from the project since teachers can understand what happens in the brain under certain environments and what strategies can be used to overcome any issue. This project contributes to the TESOL field by providing an alternative instructional view to teach ESL by understanding the functioning of the mental organ, explaining the language processing, the areas involved, and strategies to make the learning process more effectively.

To conclude, the experience of creating the handbook project makes me feel excited to combine my TESOL graduate program and previous academic experience in the neuropsychological field. This excitement gathers two significant topics in my professional and personal life, my passion for teaching ESL and my admiration of the human mental organ. The research experience allows me to become more knowledgeable of the brain's parts and functions when processing language. Recognizing how the brain processes information makes me feel confident about the strategies and sources to use when teaching ESL. In addition, I can improve the work I do with the ESL learners, for I am going to implement the BBL instructional practices in my classes by teaching my ELLs the brain's parts, functions, and the effects of the learning

strategies based on the brain functioning. Furthermore, I learned about more aspects related to the sociocultural and language challenges that ELLs face when coming into school systems in the US. Finally, I have an alternative teaching perspective because I have more instructional instruments to support my ELLs and colleagues in the educational environment. The next step is to promote the use of the handbook by holding professional development workshops, sharing instructional strategies with other teachers, administrators and students. For future research I think that I would like to write about the effects of BBL strategies to work with ELLs in the classroom based on the experience of using the handbook project.

Appendices

Appendix A: Example of a Cultural/ Linguistic Pre-Assessment

Personal communication Profile

Student: _____ **School** _____ **Grade** _____

1. Language(s) I speak (and/or read) at home or in my community _____

2. Language(s) my parents/guardians speak (and/or read) at home _____

3. Ethnicity:

African-American

Filipino

Mexican-American

White (non Latino)

Native American

Mixed Race _____

Hispanic/Latino

Pacific Islander

Asian

Middle Eastern

4. Code-Switching: When you are at school, are you aware of switching between speaking/writing textbook-type academic English and a form of English you might use outside of school? Circle: YES NO

5. Language(s) you feel most comfortable or *would prefer to use* while speaking, listening, reading, and writing while in school in a) b) c) order:

a) _____ b) _____ c) _____

6. Translation: Have you ever translated for family members or friends to help them communicate with others who did speak their same language? Circle: YES NO

7. If you answered "yes" to #6, in what types of situations have you used your communication/translation skills to help others? (Circle all that apply)

Medical appointments	Talking to repair or utility workers	Completing legal documents	While traveling
School business, parent conferences, childcare services	Buying food, general shopping, banking	Emergency situations e.g. reporting accidents, or illness	Reading information or directions on product labels
Application for work or services	Car or other appliance repair or sales	Shopping for expensive items, like cars, large appliances	Entertainment or recreation activities

8. What are some other ways you enjoy communicating ideas, emotions, beliefs, or new concepts that don't strictly involve words? (Circle all that apply)

Drawing/Painting	Mural art	Web page design
Choreography/Songwriting	Dancing/Playing an instrument	Singing
Sculpting/Wood carving	Acting/ Set design	Calligraphy
Poster or graphic design	Building small or large objects	Computer graphics

Source: The Skillful teacher, Saphier, Hayley-Speca, & Gower, (2018, p. 111).

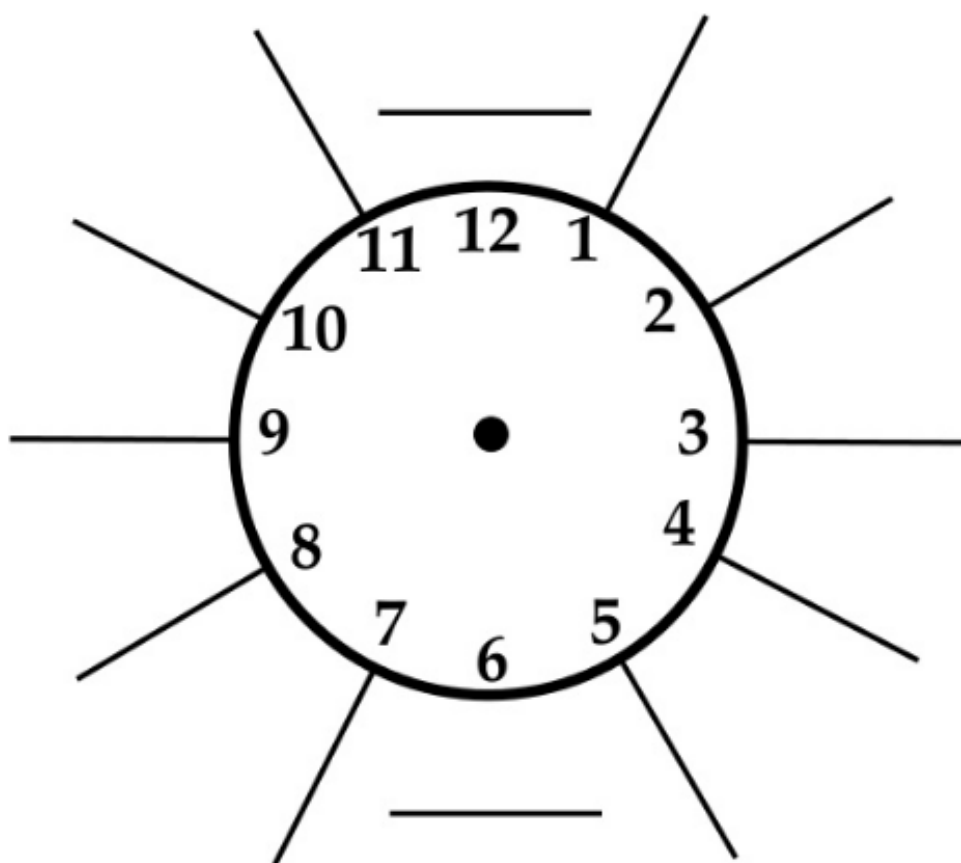
Appendix B: Example of a Personal Pre-Assessment Sample Interest Survey

Sample Interest Survey Questions	<i>Rarely Ever</i>	<i>Sometimes</i>	<i>Most of the Time</i>
1. I like to make up songs.	_____	_____	_____
2. I like to try things that are hard to do.	_____	_____	_____
3. Brain puzzles hold my interest.	_____	_____	_____
4. I like to take things apart and assemble them.	_____	_____	_____
5. I enjoy creating.	_____	_____	_____
6. I need manipulatives to learn.	_____	_____	_____
7. I am a follower.	_____	_____	_____
8. I am a leader.	_____	_____	_____
9. I prefer to work alone.	_____	_____	_____
10. I like to read.	_____	_____	_____
11. I prefer to work with others.	_____	_____	_____
12. I like to draw my own pictures.	_____	_____	_____
13. I can see visual images in my head.	_____	_____	_____
14. I have at least one pet.	_____	_____	_____
15. I enjoy animals.	_____	_____	_____
16. I would rather be outside than inside.	_____	_____	_____
17. I would rather be inside than outside.	_____	_____	_____
18. I like school.	_____	_____	_____
19. I do not like school.	_____	_____	_____
20. School would be better if . . .	_____	_____	_____
21. If I have free time, I prefer to	_____	_____	_____
a. _____	_____	_____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
22. I do not like _____ because _____.	_____	_____	_____
23. Additional Comments	_____	_____	_____
a. _____	_____	_____	_____
b. _____	_____	_____	_____

Source: The Skillful teacher, Saphier, Hayley-Speca, & Gower, (2018, p. 111).

Appendix C: Clock Buddies Worksheet

CLOCK BUDDIES



Source: Reading quest. Jones, R. (n.d.)

References

- Al-Fahid, J. (2000). *The Goodman psycholinguistic model of English reading and its applicability to semitic languages* (Doctoral dissertation, University of Arizona). Retrieved from: https://repository.arizona.edu/bitstream/handle/10150/284142/azu_td_9972077_sip1_m.pdf?sequence=1&isAllowed=y
- American TESOL Institute. (2013). Understanding natural language processing for translation [image]. Retrieved from: <https://americantesol.com/blogger/understanding-natural-language-processing-for-translation/>
- Bioninja. (2017). Hemispheres and functions [image]. Retrieved from: <https://ib.bioninja.com.au/options/option-a-neurobiology-and/a2-the-human-brain/cerebral-hemispheres.html>
- Bloch, C. Kaiser, A., Kuenzli, E. Zappatore, D. Haller, S., Franceschini, R. et al. (2009). The age of second language acquisition determines the variability in activation elicited by narration in three languages in Broca's and Wernicke's areas. *Neuropsychologia*, (45), 625 – 633. Retrieved from: https://www.academia.edu/20749645/The_age_of_second_language_acquisition_determines_the_variability_in_activation_elicited_by_narration_in_three_languages_in_Broca_s_and_Wernicke_s_area?auto=download
- Bournot-Trites, M., Jarman, R.F., & Das, J. P. (1995). Luria's theory within a cognitive theory: A Canadian perspective. *Aphasiology* (9), 123 – 135. Retrieved from: https://www.researchgate.net/publication/233176667_Luria's_language_theory_within_a_cognitive_theory_A_Canadian_perspective

Brodmann, K. (1909). *Brodmann's localization in the cerebral cortex* [DX Reader version].

Retrieved from: <https://www.appliedneuroscience.com/PDFs/Brodmann.pdf>

Caine, R. & Caine, G. (1991). *Making connections: Teaching and the human brain*. Retrieved

from: <https://files.eric.ed.gov/fulltext/ED335141.pdf>

Chomsky, N. (n.d.). Language and mind. Retrieved from:

<https://www.goodreads.com/work/quotes/1178654-language-and-mind>

Curzan, A. & Adams, M. (2012). *How English works: A linguistic introduction*. New York: NY, Longman.

El-Henawy, M. W. (2018) Using brain-based instruction to optimize early childhood English language education. *Early childhood development*, (4) 116-140. Retrieved from:

<https://www.igi-global.com/chapter/using-brain-based-instruction-to-optimize-early-childhood-english-language-education/219591>

Fingelkurts, A. Fingelkurts, A. & Marchetti, G. (2010). Brain, mind and language functional architectures. *The Open Neuroimaging Journal* (4). 26 -29. Retrieved from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2948148/>

Fraser, J. (2016). How mindfulness practice affects the brain. [image]. Retrieved from:

<https://www.presentsource.com/wp-content/uploads/2016/05/Mindfulness-Impact-on-the-Brain.pdf>

Herrera, S. G., & Murry, K. G. (2016). *Mastering ESL/EFL methods: Differentiated instruction for culturally and linguistically diverse (CLD) students*. Upper Saddle River, NJ:

Pearson.

Human brain facts. (2019). *Human brain structure and their functions in human*. [Image].

Retrieved from: www.humanbrainfacts.org/basic-structure-and-function-of-human-brain.php

Jensen, E. (2008). *Brain-based learning the paradigm of teaching*. Thousand Oaks, CA: Corwin Press.

Jensen, E. (1998). *Teaching with the brain in mind*. Alexandria, VA: Association for supervision and curriculum development.

Jensen, E. (n.d). Understanding the Brain-based learning. *Brain-based jensen learning*. Retrieved from: <http://www.jensenlearning.com/news/what-is-brain-based-teaching/brain-based-teaching>

Jones, R. (n.d.). Clock buddies. Retrieved from:

https://www.readingquest.org/pdf/clock_buddies.pdf

King, H. (2015). *Pedagogy of TESOL*. [Class handout]. Master in Teaching English to Speakers of Other Languages. Greensboro College, Greensboro, NC, US

Kovelman, I., Baker, S. A., & Petitto, L. A. (2008). Bilingual and monolingual brains compared: A functional magnetic resonance imaging investigation of syntactic processing and a possible “neural signature” of bilingualism. *Journal of Conitive Science*, 20, 153-169.

Retrieved from: <https://www.mitpressjournals.org/doi/abs/10.1162/jocn.2008.20011>

Krashen, S. (1982). *Principles and practice in second language acquisition*. [DX reader version].

Retrieved from: http://www.sdkrashen.com/content/books/principles_and_practice.pdf

Li, P. (2017). Learning a second language remodels our brains. Retrieved from:

<https://npjscilearncommunity.nature.com/users/33701-ping-li/posts/15138-learning-a-second-language-remodels-our-brains>

Li, P. (2016, June 15). What is Different in the Bilingual Brain? (F. Grosjean, Interviewer)

[Written file]. Retrieved from: <https://www.psychologytoday.com/us/blog/life-bilingual/201606/what-is-different-in-the-bilingual-brain>

Li, P., Legault, J., & Litcofsky, A. (2014). Neuroplasticity as a function of second language learning: Anatomical changes in the human brain. *Science Direct*, (58). 301 – 324.

Retrieved from:

<https://www.sciencedirect.com/science/article/pii/S0010945214001543#sec2>

Lombardi, J. (2004). Practical ways brain-based research applies to ESL learners. *The Internet TESL Journal*, (10), 8. Retrieved from: <http://iteslj.org/Articles/Lombardi-BrainResearch.html>

Luria, A. R. (1973). *The working brain: An introduction to Neuropsychology* [DX Reader version]. Retrieved from: <https://www.amazon.com/WORKING-BRAIN-Introduction-Neuropsychology/dp/B00ET4MEDY>

Magalhães, R. (2019). What happens to your brain when you learn a new language?. Retrieved from: <https://unbabel.com/blog/brain-language-learning/>

Marshall, H. W., DeCapua, A. (2014). *Making Transitions to Classroom Success: Culturally Responsive Teaching for Struggling Language Learners*. Ann Arbor: MI: University of Michigan Press.

Marshburn, C. (2019). Brain areas involved in the language process [image]. Retrieved from: <https://slideplayer.com/slide/2473044/>

Migley, K. J., Holcomb, P.J., & Grainger, J (2009). Language effects in second language language learners and proficient bilinguals investigated with event-related potentials.

- Journal of Neurolinguistics*, (22), 281-300. Retrieved from:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2678859/>
- Mikadze, Y. V. (2014). The principles of plasticity in Lurian neuropsychology. *Psychology & Neuroscience*, 7(4), 435-441. Retrieved from: <https://psycnet.apa.org/fulltext/2014-56250-002.pdf>
- Moghaddam, A. N., & Araghi, S. M. (2013). Brain-based aspects of cognitive learning approaches in second language learning. *English Language Teaching Journal*, (6), 55-61. Retrieved from: <https://files.eric.ed.gov/fulltext/EJ1076997.pdf>
- Nacamuli, M. (2015). The benefits of a bilingual brain. Retrieved from: <http://eoigijon.com/wp-content/uploads/2018/03/TC1-The-Benefits-of-a-Bilingual-Brain.pdf>
- Navarro, A. (2015). *Neurolinguistic processes and levels of learning*. [Class handout]. Master in Neuropsychology and Education, International University of La Rioja Unir, Logroño, Spain.
- Oghyanous, P. A. (2017). The effect of brain-based teaching on young EFL learners' self-efficacy. *English Language Teaching Journal*, (10), 5. Retrieved from:
<https://files.eric.ed.gov/fulltext/EJ1140108.pdf>
- Quintanar, R., & Soloviera, Y. (n.d). Análisis neuropsicológico de las dificultades en la lecto-escritura. Retrieved from <http://www.waece.org/TV/lectoescritura/pdfs/Analisis-neuropsicologico.pdf>
- Ramakrishnan, J. (2013). Brain based learning strategies. *International journal of innovative research and studies*, (2) 5. Retrieved from:
https://www.researchgate.net/publication/324704225_Brain_Based_Learning_Strategies

- Salazar, C. (2016) *Neuropsychological evaluation of comprehension, speed reading and eye movements in English and Spanish* (Master's Thesis). Retrieved from:
https://drive.google.com/drive/u/1/folders/0B_r99629AlBBb0FyTDV2VE1fcWM
- Salem, A. (2017) Engaging ESP students with brain-based learning for improved listening skills, vocabulary retention and motivation. *English Language Teaching Journal*, 10(12).
 Retrieved from: <https://files.eric.ed.gov/fulltext/EJ1160987.pdf>
- Saphier, J. Hayley-Speca, M.A. & Gower, R. (2018). *The Skillful teacher: The comprehensive resource for improving teaching and learning*. Danvers, MA: Research for Better Teaching.
- Scholastic. (2011). *Mindup curriculum*. New York, NY: Scholastic
- Sousa, D. (2017) *How the brain learns*. Thousand Oaks, CA: Corwin.
- Sousa, D. (2011) *How the ELL brain works*. Thousand Oaks, CA: Corwin.
- Sousa, D. (2011a) *How the ELL brain works*. [DX Reader version]. Retrieved from:
<https://www.worldcat.org/title/how-the-ell-brain-learns/oclc/826659713/viewport>
- Tang, B. (2018). *Alexander Luria & the History of neuropsychology*. [video]. Available from:
<https://www.youtube.com/watch?v=Cm-nz9ks6pg>
- U.S. Department of Education. (2017). *Newcomer tool kit*. (ED-ELA-12-C-0092). Retrieved from: <https://www2.ed.gov/about/offices/list/oela/newcomers-toolkit/ncomertoolkit.pdf>
- Valipour, V., & Araghi S. M. (2014). Brain-based learning strategies and its effects on student outcome in university aged Iranian EFL students. *Indian Journal of Fundamental and Applied Life Sciences*, (4), 230-233. Retrieved from:
<https://www.academia.edu/19636095/BRAIN->

based_learning_strategies_and_its_effects_on_student_outcome_in_university_aged_iran
ian_efl_students

Vocate, D. (1990). Luria on language and mind. *Language and Communication*, (10), 4. 267-284. Retrieved from: <https://www.sciencedirect.com/sdfe/pdf/download/eid/1-s2.0-0271530990900132/first-page-pdf> Sousa, D. (2017) *How the brain learns*. Thousand Oaks, CA: Corwin.